The Boston Medical and Surgical Journal

TABLE OF CONTENTS

December 11, 1919

THE MASSACHUSETTS MEDICAL SOCIETY

MEETING OF THE SECTION OF MEDICINE, JUNE 3, 1919.
THE TRANSMISSION OF INFLUENZA. *By J. P. Leake, M.D.,* Washington, D. C. 675
DISCUSSION OF DR. LEAKE'S PAPER. 679
THE BACTERIOLOGY OF SECONDARY PNEUMONIA. *By Henry T. Chickering, M.D.,* New York. 679
CLINICAL THOUGHTS ON INFLUENZA. *By Everett A. Bates, M.D.,* Springfield, Mass. 682
DISCUSSION OF DR. BATES' PAPER. 687
TREATMENT OF INFLUENZA-PNEUMONIA BY USE OF CONVALESCENT HUMAN SERUM. *By William R. Redden, M.D.,* Boston. 688
DISCUSSION OF DR. REDDEN'S PAPER. 691
THE SURGICAL TREATMENT OF ACUTE EMPYEMA FOLLOWING INFLUENZA. *By Wyman Whittemore, M.D., F.A.C.S.,* Boston. 692
DISCUSSION OF DR. WHITTEMORE'S PAPER. 695

BOOK REVIEWS

Materia Medica. By Dr. Edward R. Squibb. 696
War Neuroses. By John T. MacCurdy, M.D. 696
Manual of Laboratory Diagnosis. By Herman John Bollinger, M.D. 697
Studies from the Rockefeller Institute. 697
The Johns Hopkins Hospital Reports. 697

EDITORIALS

ORGANIZATION OF THE MEDICAL PROFESSION. 698
THE UNITED STATES TRAINING CORPS FOR WOMEN. 698
A NEW MOVE TO COÖRDINATE HEALTH ACTIVITIES. 699
MEDICAL NOTES. 699

MISCELLANY

THE EPIDEMIOLOGY OF PLAGUE. 701
NOTICES, RECENT DEATHS, ETC. 702

The Massachusetts Medical Society.

MEETING OF THE SECTION OF MEDICINE, JUNE 3, 1919.

THE TRANSMISSION OF INFLUENZA.

BY J. P. LEAKE, M.D., WASHINGTON, D.C.,
Passed Assistant Surgeon, U. S. Public Health Service, Hygienic Laboratory, Washington, D. C.

THE human experiments on the transmission of influenza at Gallops Island, Boston Harbor, during February, 1919, were in continuation of earlier experiments at San Francisco and at Boston, during November and December. 1918. These earlier experiments have been summarized in brief in the Public Health Reports for January 10, 1919. The San Francisco experiments were under the charge of Surgeon G. W. McCoy of the United States Public Health Service and Lieutenant De Wayne Richey of the United States Navy Medical Corps. The volunteers were enlisted men of the Yerba Buena Naval Training Station who had not been exposed to influenza during the autumn epidemic. They were transferred to the Angel Island Quarantine Station, San Francisco Harbor, for the experiments. On different groups of these volunteers various materials were used, with entirely negative results as regards the production of the symptoms of influenza. Several men received a heavy suspension of eight strains of Pfeiffer's influenza bacillus, unfiltered, into their nostrils; the same number received the same material after passage through a Berkefeld filter to remove the bacteria. A considerable number of men received the secretions from the upper respiratory tract of active cases of influenza fifteen to forty-eight hours after onset, instilled into their nostrils three or four hours after collection; in about half these cases the material was unfiltered and contained Pfeiffer's bacilli, group four pneumococci, and hemolytic streptococci; the others received the same material after passage through a Berkefeld filter. Similar filtered material was dropped into the conjunctival sacs of two volunteers and injected subcutaneously into another volunteer. One man received subcutaneously one cubic centimeter of blood from an influenza patient. As just stated, all these inoculations were without result as regards the production of influenza. The only clinical effect was an acute tonsillitis, apparently due to a hemolytic streptococcus, in three of the volunteers who received unfiltered secretions in their nares.

The November Boston experiments were under the direction of Lieutenant Commander M. J. Rosenau and Lieutenant W. J. Keegan, Medical Corps, United States Naval Reserve Force, and of Surgeon Joseph Goldberger and Assistant Surgeon Gleason C. Lake, United States Public Health Service. The volunteers were from the Deer Island Naval Detention Training Camp and were not free from prior exposure to influenza during the epidemic. They were transferred to the Gallops Island Quarantine Station for the experiment. Sixteen of the men received in their nares various strains of Pfeiffer's influenza bacillus, some recently isolated from cases of influenza. Thirty received in their nose and throat, by spray and swab, the secretions from the upper respiratory tract of typical cases of influenza; for part of these inoculations the secretions were filtered; in other cases the time from donor to recipient was less than 30 seconds. Ten of these same volunteers were intimately exposed for forty-five minutes to a series of ten cases of epidemic influenza from ten to eighty-four hours after onset, the sick men talking with and coughing into the faces of each of the volunteers. Ten other volunteers received subcutaneously the filtered secretions from five cases of influenza, and ten others received subcutaneously the pooled blood from the same five cases of influenza, less than forty-five minutes after withdrawal.

The results of all these experiments, with the Pfeiffer bacillus, with secretions, with direct exposure, with subcutaneous inoculation of filtered secretions and unfiltered blood, were entirely negative.

This startling result, apparently in direct contradiction of our usual ideas on the manner of spread of the disease, demanded further investigation if the opportunity could be obtained, and fortunately another set of volunteers offered themselves. The two parties of investigators combined for this third trial. The writer was added to the group, and much help was obtained from Lieutenant Commander L. W. McGuire and Lieutenant W. R. Redden of the Naval Medical Corps. We are particularly indebted to Passed Assistant Surgeon W. M. Bryan, of the Public Health Service, for constant sympathetic coöperation. Acknowledgments are also due Captain John M. Edgar, Commander F. M. Furlong, Lieutenant A. L. Grant, Lieutenant Parsons and Lieutenant T. J. Kennedy of the Naval Medical Corps, Acting Assistant Surgeons F. X. Crawford and E. M. Looney of the United States Public Health Service, Dr. Harry Linenthal, Professors Reid Hunt and Worth Hale of the Harvard Medical School, beside the donors and recipients in the various experiments.

The volunteers, as before, were from the Deer Island Naval Training Station. Two gave a history of a prior attack of influenza during the epidemic, eleven others had been in close contact with cases of the disease, twelve had casual contact, and nineteen gave no history of exposure to the 1918-1919 epidemic. They were transferred to Gallops Island and kept isolated, under daily observation, for a week before the beginning of the experiment. Those who appeared to be unsuitable during this preliminary observation and physical examination were returned to Deer Island. Temperature curves, blood counts, and Schick reactions were recorded for each volunteer, beside the bacterial flora of the nasopharynx before and after each experiment. Similar observations, except the Schick test, were made on the donors. It may be said at once that there was no relation between the reaction to diphtheria toxin and the susceptibility to tonsillitis or influenza. The opposite condition was found true for poliomyelitis by Zingher[1]—that is, the children who were attacked by poliomyelitis were found to give a much higher percentage of positive Schick reactions, indicating susceptibility to diphtheria, than the average for the same ages.

During each experiment, the members of the group undergoing experiment were isolated from the other volunteers. By making use of the hospital facilities of the quarantine station it was possible to have four such groups isolated simultaneously.

The experiments with Pfeiffer's bacillus were repeated, this time using a strain of known virulence for mice. One-tenth cubic centimeter of the culture containing five billion per cubic centimeter was fatal to white mice of 20-gram weight in 48-hours. This culture was combined with a staphylococcus culture suspended in broth and instilled into the nose and throat. The nasal and pharyngeal secretions of three of these volunteers were alkalinized with a 4 per cent. solution of sodium bicarbonate before the experiment. Three others received one-half per cent.

acetic acid, changing the reaction in the opposite direction, and the remaining four received the instillations without preliminary injection. There was no result from this experiment except a transient tonsillitis in one of the recipients, five days after the inoculation, without significant change in the flora of the throat.

Micrococci of the group found by Mathers as very frequent in the respiratory tract of influenza patients were similarly inoculated without result.

The unfiltered pharyngeal and nasal secretions of a patient twenty-two hours after the onset of what appeared to be a mild attack of typical influenza were instilled into the nose and throat of ten volunteers. One of these developed a mild exacerbation of a subacute tonsillitis three days after inoculation, his throat culture showing the same organisms as before.

One other of the ten (F.W.B.), five days after inoculation, developed symptoms hardly distinguishable from an attack of influenza, with fever, headache, backache, congestion of the fauces without tonsillitis, loss of appetite, chilly sensations, and cough. The leucocyte count, however, remained about 10,000 to 13,000, while it was 8,400 before inoculation. The temperature reached 101.3° on the first day, 100.5° on the second, 102.3° on the third, and 100.4° on the fourth day. Two days after onset an attempt was made to transfer the disease from this man to ten other volunteers by the same method of inoculation, but without result. This case, therefore, remains as a possible instance of artificial transmission of influenza by the nasopharyngeal inoculation of secretions from an early case of the disease, with an incubation period of five days.

A sudden outbreak of 215 cases of influenza among the 2200 inmates of the Portsmouth Naval Prison furnished donors for other experiments. Two groups of four volunteers each were taken to the prison in closed automobiles and kept isolated except for the inoculations. One of the groups received the nasopharyngeal washings (in Locke's solution) from very early cases of the disease—five hours after onset in two instances. Each volunteer had ten cubic centimeters of the washings instilled into his nose and throat by spray and dropper, and swallowed 25 cubic centimeters of the washings mixed with 250 cubic centimeters of milk. The other group of four received similar washings from ten prisoners who had been in recent contact with cases of influenza, as an attempt to secure transmission during the incubation period. None of these ten donors developed typical influenza, and the inoculation was without result. Two of the first group of four, on the other hand, had acute follicular tonsillitis beginning forty hours after inoculation, and in all four a strongly hemolytic streptococcus became the predominating organism in the throat. One of these cases of tonsillitis, with no leucocytosis, so much resembled influenza nine hours after onset that transfer was then made of his secretions to ten more volunteers.

In all of these ten, with one exception, the strongly hemolytic streptococcus became the predominating colony, and five of the nine developed acute follicular tonsillitis about two days after inoculation. This other volunteer (S.), five days after inoculation, suddenly began to have a headache, fever, prostration, a cough, and pains in the back. His face was flushed and his fauces and conjunctivae congested; photophobia became prominent. His leucocytes dropped from 10,000 before inoculation to 6,000, 4,000 and 5,000 during the fever. At first his nasopharyngeal bacterial flora were not much altered, but after several days of sickness, Pfeiffer's bacillus began to be the predominant organism. After a few days the temperature, which had reached from 100.2° to 103.8° each day, fell, but the prostration was still marked, and the cough and expectoration were very slow in clearing up. This appeared, therefore, to be a case of influenza. The donor from whom the patient was inoculated apparently had an acute follicular tonsillitis due to the hemolytic streptococcus (beta type) though he had in turn received secretions from true cases of influenza.

Another set of ten volunteers received the secretions from an uncomplicated case of influenza four hours after onset. All of these remained well except one (L.J.), who after 36 hours began to have fever, pain in the back and chest, cough, and anorexia. His fauces became red and photophobia was troublesome. His white blood cells fell from 10,000 before inoculation to 9,000 the day of the onset, and 4,500 later during the attack. The temperature was between 101.3° and 103° for 48 and then fell to 99.5°. Two days later the pulse rate was only 60 per minute. The same bacteria were present after as before inoculation, but instead of the hemolytic streptococcus being predominant as at first, only one colony of this organism was found on the plate made 24 hours after onset, its place being taken now by the Pfeiffer bacillus, which was second in importance before inoculation. Recovery from the attack took place in five days; the fever lasted only sixty hours. Fifty-four hours after onset, an attempt was made to transfer the infection by means of secretions to the final group of fifteen volunteers, but without success. In five of the fifteen, however, the hemolytic streptococcus became the most numerous colony, and three of the five developed acute tonsillitis.

In drawing conclusions, the uncertainty of the diagnosis of influenza in single cases must be borne in mind. However, it appears from our experiments that influenza is transmissible by means of the nose and throat secretions of persons suffering from the disease, with the nose and mouth as portals of entry, but that such transmission is far from a uniform result of such exposure; the first 24 hours of the disease were the most favorable for this transmission. The customary measures for prevention are therefore reasonable.

The conduct of human experiments bears the double responsibility of securing facts of value to the human race and of avoiding any unnecessary injury to those who have yielded their bodies to the service of others. When we read the report of Walter Reed, Carroll, Agramonte, and Lazear, the paucity of our results is humiliating, but we were fortunate to have no more serious cases of illness than the tonsillitis and influenza just mentioned. Despite these illnesses, the average weight of the volunteers was slightly more on discharge than at the beginning of the experiments.

In contrast to the difficulty and rarity with which influenza was transmitted is the comparative ease and frequency with which tonsillitis appeared in those inoculated, even though the donors had no tonsillitis. The development of the tonsillitis was in almost all cases associated with the predominance of the hemolytic streptococcus, type beta, in plates inoculated from the throats of the patients.

In the February experiments no attempt was made to transmit influenza by filtrates in spite of the Tunis experiments of Charles Nicolle and Lebailly reported at the Paris Academy of Science last October. Reproduction of such a disease as influenza in dumb animals must be dubious and we have no data as to the degree of isolation of Nicolle's human volunteers. At the next weekly session Dujarric de la Rivière reported a positive subcutaneous inoculation on himself, using filtered serum, but without controls. Selter's experiments on himself and his assistant at Könisberg, reported in the *Deutsche Medizinische Wochenschrift* for August 22nd are quite inconclusive. Filtrates were used for nasal and throat inoculation, but there was no isolation and the fever was slight or absent. Paraf and Goubault reported before the Paris Société Médicale des Hôpitaux at the last January meeting a repetition of Nicolle's technic, but using well-isolated volunteers, and controlling the experiment with unfiltered material. The filtrates, introduced into the posterior pharynx or under the skin, did not give rise to influenza, while two of the same volunteers receiving the unfiltered secretions in their throats, after an inoculation period of two and three days respectively, had headache, fever, and rhino-pharyngitis, which was diagnosed as influenza. The monkey experiments of Gibson, Bowman and Connor, reported in the *British Medical Journal*, December 14th, are quite inconclusive. They also used Nicolle's technic, and the interpretation of illness in monkeys is open to the same objection. Still more recently, Sir John Rose Bradford, and Captains Bashford and Wilson have briefly summarized their work on filter-passing viruses in a number of diseases including influenza (*British Medical Journal*, February 1st, 1919, also *Lancet and Journal of the Royal Army Medical Corps*). This influenzal work deals with cultures of a coccuslike body less than half a micron in diameter, and with its inoculation into guinea-pigs and monkeys. Without human experiments, the identity of the disease produced must be open to serious question.

The entirely negative results in our experiments with Mathers' coccus and with the Pfeiffer bacillus appear to offer some ground for doubting any causal relationship between these organisms and the disease influenza, but in view of the paucity of positive results with direct inoculation of secretions, no conclusions are justifiable from this work alone. As with the filterable virus, the verdict is simply "not proven." The green-producing diplo-streptococcus of Mathers[2] seems to be similar to that found by Rosenow[3] in Rochester, Minnesota. With regard to the Pfeiffer bacillus, plates from the naso-pharynx showed this organism present in the healthy men very frequently before inoculation as well as after. In two of the cases which were apparently influenza, it became the predominating organism at some time during the illness.

Aside from offering some justification for our usual attempts to prevent influenza by diminishing the opportunities for human contact, these experiments may, we hope, suggest further work toward the solution of the problem of infection and immunity, and in particular, toward determining why an infection which in nature appears to be most facile in transmission, under apparently favorable conditions has been so difficult to transfer.

REFERENCES.

[1] Zingher: Am. Jour. Dis. Child., March, 1917.
[2] Tunnicliffe: Jour. A. M. A., Nov. 23 1918.
[3] Rosenow: Jour. A. M. A., Jan. 4, 1919.

DISCUSSION.

Dr. Alfred Worcester, Waltham: I have had very little experience with it, and what I had was in Switzerland. Last summer in July the epidemic was bad enough there; in November it was a great deal worse. In the week after the armistice the Bolsheviki took possession of some parts of Switzerland and of the city of Zurich where I happened to be. The city government took refuge in the barracks. The Government of Switzerland was only able to take care of itself by mobilization of its whole army, and that brought into Berne, a city of 60,000 people normally, a division of 25,000 troops. It was cold and raw, and there were not barracks enough for shelter even with the use of school-houses and the churches. At the end of seven days there were 2,500 of those men, one tenth of the division, flat on their backs with the flu. They were lying on their blankets perhaps, if they were so fortunate as to have them, perhaps on their overcoats, in the hallways of the public buildings and in the churches, and there they died—400 of the 2,500 within the next week.

The disease spread somewhat to the civil population. Of course, the members of the different embassies were scared blue. The Swiss physicians were pouring in medicine at a tremendous rate and giving heart stimulation from the very first, but their patients were dying so fast that one could hardly make up his mind what to do before the end came. At first I was in great favor because those patients I saw in consultation happened to live, but after an English general and a Red Cross worker died, whom I had undertaken the care of, my reputation suddenly diminished.

It is rather discouraging on coming home to find that after all these experiments nobody can find how the disease is propagated. That it passes rapidly from one to another is plain. The Red Cross worker who died was a volunteer nurse who only three nights before took care of a man who recovered. She went perfectly well to her night service; she came home in the morning tired, but before night she was sick and had that peculiar blue color which seemed to mark all early fatal cases.

I am only taking up your time to voice what seems to be the general tone of discouragement that no positive means of prevention is at present at hand to prevent the spread of the disease: for, of course, until we discover how the disease is spread, ways of prevention are of no avail.

THE BACTERIOLOGY OF SECONDARY PNEUMONIA.

By Henry T. Chickering, M.D., New York.

It has been estimated that over five hundred thousand individuals in this country alone have died as the result of influenza infection during the past nine months, which predicates in almost every instance a secondary pneumonia. For the purpose of the present discussion, it is desired to consider as secondary pneumonia those varieties of pulmonary lesions, usually proncho-pneumonic in type, that occur so frequently with influenza and measles, more rarely as a terminal result of chronic constitutional or metabolic disease, with infants suffering from malnutrition, and with adults following surgical operations, in contradistinction to acute lobar or primary pneumonia.

From a bacteriological study of lobar pneumonia extending over several years at the Hospital of the Rockefeller Institute,[1] pneumococcus was found to be the organism most commonly asociated with the disease. (Table I.)

Table I.—Microörganisms Associated with Lobar Pneumonia.

Pneumococcus	454
Friedlander bacillus	3
Streptococcus pyogenes	7
Streptococcus mucosus	1
Staphylococcus aureus	3
Mixed infections	6
B. influenzae	6

Furthermore, it was noted upon classification of the pneumococcus into biological types that the more virulent disease producing varieties, types 1, 2, and 3, were responsible for 79.8% of the infections, whereas the type 4 pneumococcus, the group found most commonly in the nose and throat of normal individuals, was present in only 20.2% of 454 cases.

By the use of various differential culture media, it is possible to isolate in a considerable proportion of instances the pneumococcus from the nasal and throat secretions. Dochez and Avery[2] and Stillman,[3] who have made extensive studies of the bacterial flora of the upper respiratory passages of normal men, found the pneumococcus present in 43.2% of 398 individuals. But here in contrast to the results obtained from the examinations of pneumonic sputum, the type 4 pneumococcus was found predominant. Olmstead[4] in an examination of 2477 individuals about to be operated upon for some surgical condition, recovered the pneumococcus from the saliva or sputum in 32.2%, of which 73.8% were classified as pneumococcus type 4. A comparison of Olmstead's and Stillman's results is shown in Table II.

Table II.—The Occurrence of Types of Pneumococcus in Sputum of Normal Individuals as Compared with that of Lobar Pneumonia.

Pneumococcus Type	Olmstead 798 cases	Stillman 172 cases	Lobar Pneumonia 454 cases
1	0.6%	2.2%	33.3%
2	1.2%	2.2%	29.3%
2a	11.2%	13.6%	4.2%
3	13.0%	23.4%	13.0%
4	73.8%	58.5%	20.3%

When these studies were made by Olmstead and by Stillman the methods used were those which would enhance the growth of pneumococcus and retard that of other organisms present in the sputum. In order to learn more concerning the variety of other bacteria present, it is necessary to cultivate the secretions on media which will favor all alike.

When this is done, one finds many varieties of streptococcus, the viridans, the hemolytic and nonhemolytic strains, several kinds of staphylococci, B. influenzae, and members of the Gram-negative diplococcus group, as M. catarrhalis, M. flavus, M. pharyngosiccus, diphtheroids, and the bacillus of Friedlander. Just what determines the presence or absence of any given group of bacteria in an individual's nose and throat is still obscure. In a few cases organisms that are known to produce the most severe forms of disease have been found over a period of years during which time the host has enjoyed good health. This is notably true in the case of carriers of pneumococcus mucosus and the Friedlander bacillus. Apparently there are many favorable factors necessary before the bacterial parasite can effect a "take." Some of these factors seem obvious, though difficult to subject to scientific proof; those of sudden change of environment or occupation, those incident to the congregation of large masses of individuals together, and conditions favoring undernutrition. It is under these conditions that epidemics flourish and secondary pneumonias develop. Witness the terminal bronchopneumonia of the emaciated infant and the surgical pneumonias following general anaesthesia. Under unusual living conditions, diseases mild in themselves, as measles, or epidemic infections, as influenza, which may slumber for long periods of years, light up, spread rapidly, and render individuals susceptible to most virulent forms of pulmonary disease.

When pneumonia develops under these circumstances, a study of the micro-organisms present in the sputum and in the lungs reveals not the presence of the common disease producing types found in 75% of cases of lobar pneumonia but rather the type 4 pneumococcus, the group found so commonly in normal people and various other organisms as the streptococcus and the staphylococcus.

Olmstead, in an examination of the sputum of 126 cases of post-operative pneumonia, found the pneumococcus in 95 or 75.4% and of those positive, pneumococcus type 4 was found in 73 instances, or 61.9%. That these organisms found in the sputum had actually to do with the disease present was proved in many instances by demonstrating specific agglutinins in the patient's serum for the same type of organism found in the sputum, blood, or lung at autopsy. A comparison of these results (Table III) with those obtained from the examination (Table II) shows a close similarity. Here apparently all that was necessary in a certain proportion of individuals was the strain of an operation and the irritant effects of a general anaesthesia to allow organisms residing in the upper air passages an opportunity to produce pulmonary lesions.

An investigation by Wollstein,[5] in 1905, of the bacteria present in the pneumonic lungs of 67 infants who had previously suffered from various morbid conditions as athrepsia, entero-collitis, diphtheria, measles, etc., showed similar results, except that in addition to the pneumococcus, a considerable number showed streptococcus, staphylococcus, and more rarely diphtheria bacilli and B. coli. At the time this work was done no attempt was made to isolate the influenza bacillus. Subsequently in 1906 the same author found B. influenzae in 16 of 53 cases of bronchopneumonia.[6] More recently, in 1916, Wollstein[7] studied the type of pneumococcus infection in 36 infants and found the group 4 pneumococcus predominant.

But few statistics are available concerning the bacteria associated with pneumonia developing in individuals having chronic heart, kidney, or metabolic disease. In the cases studied personally, of three diabetics, two had a type 3 pneumococcus infection and one a type 4 pneumococcus. One patient having chronic valvular cardiac disease died with a pneumococcus mucosus bronchopneumonia.

With the complicating pneumonia following the recent influenza epidemic, there is a striking similarity in the kinds of micro-organisms found by making cultures from the lungs post mortem to those reported by Wollstein in the bronchopneumonia of infants. Here again instead of finding single infectious agents present in a given case and that usually the pneumococcus, many other bacteria were found, notably the staphylococcus aureus as at Camp Jackson, S. C.[8] Frequently two or three kinds of bacteria were found in a single lung. (Table III.)

From this it seems justifiable to assume that the lung complications are the result of infection by autogenous micro-organisms, those carried commonly in the naso-pharynx. What determines the particular type of flora in the mouths of individuals in certain localities is not clearly known but differences seem to exist. But the immediate exciting agent of the secondary pneumonia in an individual whose resistance is depressed by a primary infection apparently resides upon the mucous membrane of the patient himself in the majority of instances. For how else can one explain the occurrence in the same ward or military organization of almost as many kinds of pneumonia, if classified on the basis of the infectious agent as there are kinds of microorganisms found in the normal nose and throat?

With the secondary pneumonias following measles in the army camps, the outbreak was in most instances slower in evolution than was the influenza epidemic. Here the hemolytic streptococcus, found so frequently in the secondary pneumonias, had an opportunity to enhance its virulence until after a few months not a few cases of apparently primary pneumonia were caused by this organism. While great interest and attention have been focused upon the hemolytic streptococcus in connection with measles, it is by no means the only organism associated with this infection. The influenza bacillus in pure culture has been found in such secondary pneumonias as well as pneumococcus and staphylococcus.

TABLE III.—BACTERIA ASSOCIATED WITH SECONDARY PNEUMONIAS.

ORGANISM	OLMSTEAD Post-operative pneumonia 126 cases.	WOLLSTEIN Infant Broncho-pneumonia 103 cases.	INFLUENZA-PNEUMONIA Post-mortem lung punctures 312 cases
Pneumococcus, type 1	1	2	6
" type 2	1	2	16
" type 2a	8		
" type 3	12		29
" type 4	73	18	41
Pneumococcus, type undetermined		10	2
Pn. 1 and streptococcus hem.			1
Pn. 1 and B. influenzae			1
Pn. 2 and staphylococcus aureus			5
Pn. 2 and B. influenzae		1	3
Pn. 2 and B. inf. and staph. aur.			1
Pn. 2 and streptococcus		1	
Pn. 3 and staph. aur.			4
Pn. 3 and staph. aur. and B. inf.			1
Pn. 3 and B. influenzae			7
Pn. 4 and staph. aur.		1	16
Pn. 4 and staph. aur. and B. inf.			1
Pn. 4 and B. inf.		1	2
Pn. 4 and B. diphtheroid			1
Pn. 4 and M. flavus			1
Pn. and staph. aur.		11	
Pn. and B. tubercle		7	
Pn. and streptococcus		10	
Pn. and Klebs-Loeffler B.		1	
Pn. and B. pyocyaneus		2	
Pn. and B. coli		2	
Staphylococcus aureus		6	92
Staph. aur. and B. inf.			17
Staph. aur. and strep. non-hem.		3	3
Staph aur. and strep. hem.			5
Staph. aur. and strep. vir.			2
Staph. and misc. organisms			4
B. influenzae	4		19
B. inf. and strep.			4
Streptococcus hem.	9		6
Streptococcus non-hem.		6	7
Strep. and misc. organisms	1	6	4
B. mucosus capsulatus	9		
Misc. organisms		3	5

If the secondary pneumonias are dependent upon the kind of bacteria carried in the nose and throat, it explains to some extent the diversity of reports concerning the types of bacterial infection in various localities. The meager reports of the presence of staphylococcus aureus in the lungs of secondary pneumonias in some instances, at least, can be explained by its having been regarded as a contamination and thus discarded from the report.

These studies have a direct bearing upon the clinical management of the individual patient. More attention must be directed to the care of the nasopharynx in acute infections. Thus far no ideal sterilizing agent for the bacteria of the upper air passages has been found. But much can be accomplished as regards cleanliness and suppression of congestion of the mucous membrane of this region. Secondly, it is reasonable to suppose that the violent paroxysms of nonproductive coughing associated with measles and influenza aid in the dispersal of the bacteria of the nose and throat into the deeper air passages of the lungs. The harassing cough must be controlled. Occasionally elevation of the head of the bed a foot or more or various inhalations are helpful. But usually codiene is needed and should be given without hesitation in sufficient amounts to obtain the desired results.

SUMMARY.

In contrast to primary lobar pneumonia, which is almost always caused by the pneumococcus and moreover usually by the definite disease producing types of pneumococcus, the secondary pneumonias are associated with a great variety of micro-organisms, pneumococcus, streptococcus, staphylococcus, B. influenzae, Micrococcus catharralis and flavus, B. Friedlander, and others.

In primary lobar pneumonia, it is unusual to find more than one organism in the lungs in fatal cases. With the secondary pneumonias it is not uncommon to find two or more.

The types of bacteria and their percentage occurrence in secondary pneumonia compare closely with the bacteria commonly residing in the nasopharynx. Up to the present time there is no evidence that the strains isolated from the lungs are biologically different from those in the nose and throat.

What determines the bacterial flora of the normal individual's mouth depends upon a multiplicity of factors. Under ordinary conditions they probably cause little harm. But under the temporary lowering of the individual's resistance, they are able to produce widespread lesions and in the presence of an epidemic may enhance in virulence to the extent of being able to cause what is apparently a primary pneumonia.

Careful hygiene of the upper respiratory passages and measures aiming to prevent the dispersal to the lungs of bacteria residing there are advised.

REFERENCES.

[1] Avert, O. T.; Chickering, H. T.; Cole, R.; Dochez, A. R.: Acute Lobar Pneumonia. Monographs of the Rockefeller Institute for Medical Research, No. 7, Oct. 16, 1917.

[2] Dochez, A. R., and Avery, O. T.: Jour. Exp. Med., 1915, Vol. xxii, p. 105.

[3] Stilman, E. G.: Jour. Exp. Med. 1916, Vol. xxiv, p. 651.

[4] Olmstead, M. A.: A Bacteriological Study of Post-operative Pneumonia. Unpublished paper read before the American Association of Immunologists, Philadelphia, May 29, 1918.

[5] Wollstein, M.: Jour. Exp. Med., 1905, Vol. vi, p. 391.

[6] Wollstein, M.: Jour. Exp. Med., 1906, Vol. viii, p. 681.

[7] Wollstein, M., and Benson, A. W.: Am. Jour. Dis. Child., 1916, Vol. xii, p. 254.

CLINICAL THOUGHTS ON INFLUENZA.

BY EVERETT A. BATES, M.D., SPRINGFIELD, MASS.

SPENCER's oft quoted lines,—"What evil star on you hath frowned and poured his Influence bad"—is appropriately suggested in view of the indecisive and still debatable evidence as to the exact cause of the recent alarming and world-wide scourge.

All contributions to its etiology must be balanced and controlled, and conclusions held in abeyance until uncertainties are eliminated or harmonized, and the primary infective agent known. Apart, however, from our great interest in the final summation of observations from varied sources and from the organized medical departments of many armies,—the clinical picture of influenza and its attendant virile complications must remain to all who were associated with its victims as a vivid, hideous memory; but leaving the imagination an almost unwilling believer that such an evil time has existed.

While this picture of influenza varies with the prominence of local symptoms and the thought is more readily occupied with the severity of the respiratory tract invasions, as an almost distinct and definite entity,—the simpler type of this epidemic is of interest clinically in comparison with other similar outbreaks; and it is pardonable to quote Sir George Baker's account of the epidemic of influenza in London in 1762:—"It was characterized by alternate heat and chills, by a constant cough, sometimes dry, occasionally accompanied by a little thin mucous expectoration. There was depression of strength, a sense of weight, and severe pain in the forehead and temples; inflamed, swollen, and watery eyes, with photophobia, frequent sneezing, and altered voice. There was painful rawness felt in the wind-pipe and chest, with, in some cases, a feeling of choking, and wandering pains in the arms, legs, and sides. The fever was chiefly nocturnal, but even then so slight that it rarely interfered either with sleep or food. There was more or less perspiration, and where it was profuse the disorder was relieved or cured. In all cases there was more depression of spirits and loss of strength than the character of the disease seemed to account for; and convalescence was often tedious and imperfect." In this portrayal of an epidemic occurring more than a century and a half ago we find an outlining of a symptomatology that fits surprisingly well with that of the recent one when uncomplicated. But while a striking similarity may exist, our memory recalls the severe muscular, head and back pains of the influenza outbreak of '89 and '90, not notably present during this as evidence of an interesting variation in different epidemics of a disease noted for its varied aspects. As the recent epidemic rolled up the number of its early victims, and apart from the too frequent pulmonary complication, and other clinical phenomena which rightly or wrongly were attributed to influenza, we recognize a rather constant and characteristic clinical picture with definite tell-tale symptoms.

The suffused eyes, sneezing and purposeless cough—almost, especially in children, suggesting the early stage of measles—the fairly constant, slight, early cyanosis of the lips, the slow, often dicrotic pulse, the sudden lowering of resistance disproportionate to the severity of the disease, the subjective substernal feeling of soreness and rawness, were the most common early symptoms.

And as our experience rapidly became larger we learned to estimate the possibilities that the fourth, fifth, and sixth days might have in store for the patient, and to note this or that variation in the fever, and typical symptoms with well justified apprehension; for sputum examinations by a good technician in 70 of the first cases showed alone or in combination some type of pneumococcus in 62—all but eight, and 47 times alone——some strain of streptococcus alone or in combination in 7, and the Bacillus influenzae in less than one-third, or 19 cases, thus early establishing a feeling of uncertainty as to the etiologic significance of the latter organism, but leaving no doubt as to the number of associated bacteria capable of a high degree of pathogenic harm.

Whatever may be the eventual fate of Pfeiffer's bacillus, or, a possible conclusion, an influenza virus, the presence of which caused a feeble and lowered immunity in the host to other bacteria,—clinically, we were often confronted with what seemed to be a primary lung infection not secondary in any way to an earlier influenza. It was a new picture. The subject commonly selected was a healthy young adult from 20 to 35, so that I reasoned for a while that the epidemic of '90 might have given a very general immunity to those over the latter age.

The onset of lung involvement was never like the typical pneumonias; but often a slow, gradual rise of temperature, and a steadily increasing toxemia, with an inability to demonstrate by physical examination of the chest the presence of a definite lung pathology.

Where pneumonia did not occur, as in those cases running a short favorable course, there was a preponderance of tracheal congestion, with distressing, hard cough, sore windpipe, and pain in the epigastrium and adjacent lateral areas, either from muscular spasm, or possibly a lymphatic extension from the region of primary infection. The absence of friction sounds has been universally observed even in influenzal pneumonia: and the assumption of a diaphragmatic pleurisy in the milder cases is not warranted.

And there were those, where lung invasion was unsuspected because it could not be demonstrated, that were probably slight bronchopneumonias; so that some observers have believed that the whole epidemic was purely pneumonic, varying in degree of intensity according to the extent of the process; fatality at least was never due to pure influenza. My own observations lead me to the conclusion that the trachea may be considered the most constant primary point attacked, with recovery in a few days where the disease remained thus localized; but readily extending through the blood stream, or latent and exploding as it were in numerous small, disseminated and deeper seated foci, by the coalescence of which large areas of lung tissue became involved.

It was a fair working rule that if any patient had continued fever for more than five days, pneumonia was present, no matter if the physical examination gave little evidence; and as a complication of influenza it was most often noticed in those who were unwise enough to leave their beds before 48 hours after the subnormal temperature.

In the Springfield Hospital, out of 80 nurses, 33 contracted influenza; there were no deaths and only six cases of pneumonia complicating; this fortunate result I feel sure was due to the wise and strict orders of the superintendent of the Hospital,—that every nurse should report upon the earliest feeling of illness.

In the course of influenza there seemed often a period of calm before the explosion of pneumonia; the temperature was slight, the pulse slow, and the respiration gave no hint, except perhaps a persisting moderate cyanosis of the lips and finger nails—but enough to alarm the observer at once; for among all the symptoms of this epidemic disease no one augured a greater possible ill to the patient than this striking omen; it varied in degree and extent according to the severity of the attack, and must have been due to the degree of toxicity of the infecting agent; for it occurred early and before embarrassment of the respiratory area or of the right heart had developed. In the earliest cases I was led to inquire if any coal tar products or combinations had been taken, owing to the similarity of color produced. If to the symptom cyanosis there was added a sharp rise of temperature and bright bloody expectoration, we knew the fight was on. Bloody sputum—varying in shades of red, and in consistency from thin and watery fluid in large amounts to more tenacious smaller quantities—was a definite hall-mark of influenzal pneumonia, and distinctly separated it from other types; rusty sputum was seldom seen and we saw nothing of the greenish, coin-like lumps which Pfeiffer taught were so characteristic of influenza.

The blood in the sputum, sometimes amounting to haemoptysis, the very common and often profuse nose bleed, the not infrequently exaggerated menstrual flow or actual metrorrhagia, gave a distinctive hemorrhagic form to this epidemic; and as a dominant symptom it is not often mentioned by writers upon previous outbreaks of the disease.

While the incidence of other symptoms in the course of the disease is noteworthy,—as apathy, drowsiness, and mild delirium, which sometimes became so active as to require constant watching, and in two cases the use of the jacket; as an epileptic status of an hour's duration in

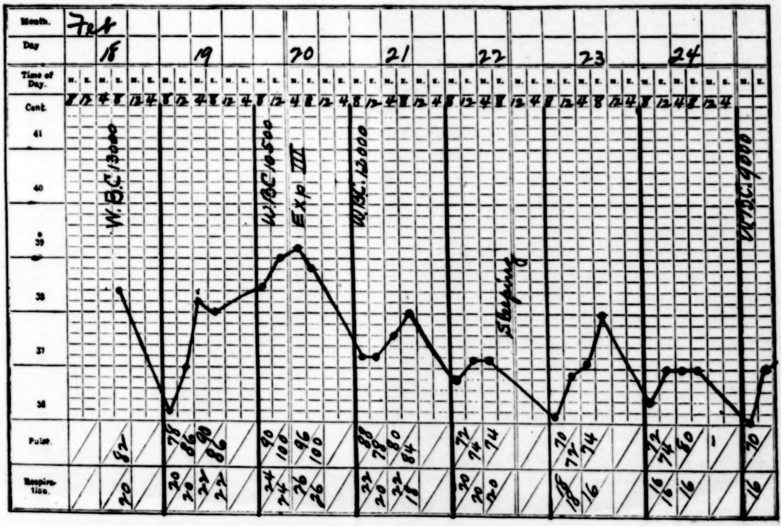

CHART I.—Temperature chart of F. W. B., inoculated Feb. 13, 5.30 P.M., with the secretion of an early case of influenza (22 hours after onset).

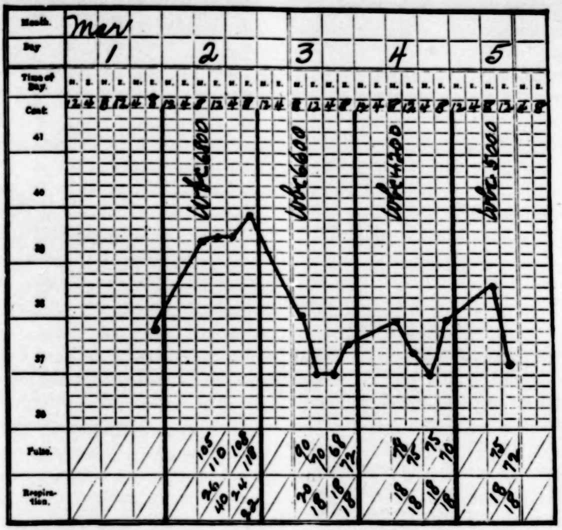

CHART II.—Temperature chart of S., inoculated 7 P.M., Feb. 24, with secretions from a case of tonsillitis who had, in turn, been inoculated two days previously with secretions from very early cases of epidemic influenza.

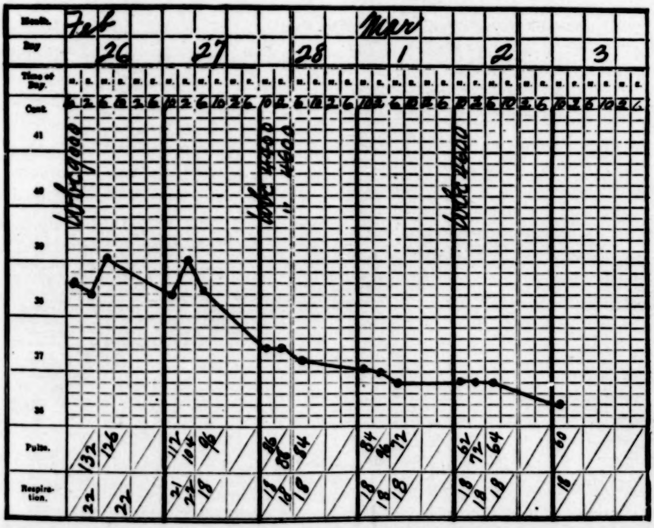

CHART III.—Temperature chart of L. J., inoculated 7.30 P.M., Feb. 24, with secretions from a case of influenza four hours after onset.

the midst of pneumonia; as nausea and vomiting of predominant intensity; as adult acidosis; as jaundice—a common symptom in a group of young lady college students; as diarrhea in a few—the first influenza seen September 16, a young man from Commonwealth Pier, being of this type; all these thus illustrating the protean manifestations of the disease,—the consideration of its so-called complication bronchopneumonia as the one characteristic clinical picture of influenza constitutes primarily the discussion of the disease.

As has been stated, it was often difficult from physical examination to find that the pneumonia one had reason to suspect existed; and often chest examinations resulted in a confusing conclusion, owing to the absence of the commonly accepted signs of pneumonia, or a difficult explanation of the findings which were by no means constant in type, and sometimes of changing character, even with a change in lateral posture; for all degrees of involvement existed, and all sorts of combinations, from capillary bronchitis to diffused lobular or confluent conditions. In the larger number of cases the pulmonary process began in the posterior left lower lobe, generally inside the inferior angle of the scapula, and was evidenced first by slight dullness and impaired breath sounds, at times accompanied with an explosion of fine râles on deep inspiration.

Commonly at this time nothing could be detected in the opposite side; but later this was with rare exceptions sure to be affected, not always to the same extent; this second involvement was in a few cases delayed until the original process had abated, and a sense of security was rudely dispelled by renewed temperatures and a return of desperate conditions. Very soon after the appearance of the earliest signs, small but fairly distinct patches of bronchovesicular breathing and rather distant increased voice sounds could be heard; these areas seemed to extend by coalescence, and finally, often rapidly, occupied large portions of the lungs, generally in the middle and lower back, appearing eventually as massive consolidations with tubular breathing and voice sounds in typical pneumonic purity. Little evidence of an attendant bronchitis existed in these completely solidifying portions at any stage; but at their margins and often through the lateral chest zones and into the anterior, the bubbling, nonconsonating râles of the medium sized and finer bronchial tubes were apparent. The apices were often involved secondarily, the process giving more frequently the signs of bronchitis or bronchiolitis than of pneumonia.

In the very fat and almost always fatal cases there was less completed coalescence of pneumonic areas and a more extensive and generalized lobular process with signs lacking in definition; these showed an earlier urgent dyspnoea, abundant pink or red sputum and a "heliotrope" tinted cyanosis, changing to an ashen pallor before death. Occasionally the patient seemed to be drowning in the excess of his pulmonary secretions.

One physician with more emphasis than elegance exclaimed, "These are not pneumonias, but lung rot."

Of peculiar and startling interest were those cases of what were probably extensive compensatory emphysema with rupture into the loose mediastinal tissue and attendant upon widespread bronchopneumonia: in a child the greatly increasing lung volume caused in places a laceration of the costal pleura; in an adult the appearance of subcutaneous emphysema was first noted as a painful lump in the cheek, suggesting the look of a good-sized chewing quid; later, crepitation extended to the groins; in another, there was marked exophthalmus, with swollen features, enormous neck, and prominent breasts; one emphysematous case recovered; in this the praecordial area of dullness was replaced by one of tympany which was also present over the left apex; these signs could not have been due to pyopneumothorax: convalescence was very stormy and included an abscess of the left lung with rupture into the pleural cavity, and empyema.

It was never possible in typical influenza pneumonia to demonstrate beyond doubt fluid in the pleural cavity: a sense of percussion resistance at times suggested effusion, and even the ray findings were occasionally positive, when the needle test was a dry tap; if fluid were present it must have been as a thin layer and crowded upward by excessive lung volume.

During the epidemic, empyemas were rare, and when present warranted the conclusion that the case had been one of ordinary pneumonia. It was possible for a primary influenzal pneumonia to be followed after a period of normal temperature by lobar pneumonia with intense diaphragmatic pleurisy.

One needed during the convalescence of these influenzal pneumonias to consider carefully the probable chest condition in order to establish with a reasonable degree of accuracy the actual pathology; the persistence of dullness and modified breath sounds was notable; and generally, even after the decline of temperature warranted the assumption of an established convalescence, there was not the ratio drop in pulse rate and respiration usually seen in pneumonia.

Very commonly in these pneumonias the thermometer reading was 102°, but temperatures in some cases ran high; one was recorded and carefully verified at 108° (rectal) in which recovery occurred. Subsidence of temperature was more often by lysis. Even with high temperatures there was often a slow pulse rate, this rising in the later stages; but whatever the rate there was always in the beginning a distinct impression that the cardio-vascular system was profoundly depressed, and early led to the consideration and advisability of cardiac stimulation; blood pressure readings in a good proportion of all cases were low, especially the diastolic, and in keeping with a toxic myocardium; the leucocyte count was low where resistance was low, and was peculiarly constant during the initial infection and early pneumonia stage, persisting throughout in the fatal cases.

The consideration of influenza from its clinical side has been elaborated and made possible by the opportunities that our great cantonments gave for specialized and statistical study; clinical thoughts without the aid of notes can at best record only impressions.

All clinical observation has for its ultimate purpose the therapeutic improvement of the existing disease and the lessening of the patient's danger.

Influenzal pneumonia gave the medical profession throughout the world a clinic in respiratory disease of unsurpassed interest and an opportunity to test its resources against the most virulent infection of modern times.

In spite of an acknowledged impotence in the fortunately rare fulminant case, where an overwhelming toxemia and a respiratory exodus quickly closed the scene, the recrudescence of the epidemic after Victory Day found physicians more alert and with thoughts better crystallized.

Every influenza became a pneumonia suspect; there was daily search for the impaired percussion note at the bases, or the fine crackles on deep inspiration and cough, or the broncho-vesicular breathing and whispered voice; at times there was typing of sputa and the consideration of sera, difficult to secure when at a distance from large clinical centers; there was the recognized importance of rest and a complete relief from cough at night by means of dependable sedatives; there was an earlier thought of cardiac support anticipating a possible exhaustion of the heart muscle; there was a more systematized vigilance, and a knowledge and definition of rational procedure in treatment that gave a sense of satisfaction even in the presence of defeat.

The spirit of untiring devotion among medical workers was never more stimulated than during the recent ordeal. In spite of the tears and tragedies left by the ebbing tide of this great wave of pestilence, its review in retrospect will give courage for the future.

DISCUSSION.

DR. P. CHALLIS BARTLETT, Newton: I will take but a moment to summarize the results of the clinical follow-up on influenza cases, studied by the Community Health Station at Framingham. It seemed necessary for us to find out as much as possible about the after-effects of the influenza epidemic.

In this clinical examination work we have been able to examine 700 cases following influenza. We tried to select for this examination work only the cases that had had well defined influenza.

1. Most of the examinations were made at their own homes.
2. The majority of the examinations were made from two to six months after the people had recovered from the influenza.
3. Forty-one per cent. of the people examined were in the industrial age group.
4. Broncho-pulmonary signs were found in 11%; in examinations on other groups previous to epidemic, 6%.
5. Cardiac signs were found in 8%; in previous examinations, 5%.
6. Active tuberculosis cases were found in 2%; in previous examinations, 1%.

This is somewhat modified by the fact that there were more people with pulmonary symptoms who requested examinations than in previous drives.

Many physicians have felt that tuberculosis would be increased to some extent by reason of the influenza epidemic. In our work thus far we have seen but little actual increase as the result of the influenza.

Treatment of Influenza-Pneumonia by Use of Convalescent Human Serum.

By William R. Redden, M.D., Lieut., M. C., U. S. Navy.

Chief of Medical Service, Chelsea Naval Hospital.

On September 28th, 1918, serum from convalescent influenzal pneumonia patients was used at my suggestion, in the treatment of this type of broncho-pneumonias at the Chelsea Naval Hospital on the service of Lt. Comm. McGuire. The outcome in the treatment of 151 such cases has already been reported in the *Journal of the American Medical Association*,[1] where details of the procedure are given in full.

It is now my purpose to present the results of similar treatment in 100 cases in private practice.

At the time of the first report it was considered impracticable to do this type of work outside of a hospital. However, during the early part of December the demand for such treatment became so urgent that I, with my assistant, Mr. Arno, undertook the work of obtaining serum from civilians and of treating all cases which came to my attention, whenever I had serum. May I say in passing that I have never had a patient, either in the Naval Hospital or outside, who did not willingly give me all the blood I requested. In fact, they all considered it an honor to be able to help.

This report necessarily differs from those preceding, chiefly because all but five or six of these cases were seen from two to five days later in the disease than those at the Naval Hospital, where the majority of the cases developed the pneumonic complication on the wards and were given serum within the first twenty-four hours of the appearance of definite lung signs. The reason for the delay was due mainly to the fact that many of the physicians did not wish to have serum given when a patient appeared to be taking care of the disease without its help.

The diagnosis was usually established by the clinical influenzal onset of high temperature, headache, and a varying amount of pains and aches, and a low white blood count, followed in a few days by chest signs, either with or without intervening normal temperature. I have omitted several cases where lung signs were doubtful, so that this group includes only those showing definite signs of lung involvement. All but four cases were seen by at least two, and about one-fourth by three physicians.

The data are summarized in the following tables.

Table I.—Persistence of Fever after First Injection of Serum.

Normal in 24 hours or less	42
Normal in 58 hours or less	33
Normal in 72 hours or less	8
Normal in four days +	1
	84

Table I shows that the temperature in almost one-half of the cases dropped to normal within twenty-four hours of the first injection of serum, and that in three-quarters the temperature was normal within forty-eight hours. This, to me, indicates a decided shortening of the course of the disease.

Table II.—Number of Injections Each Patient Received.

Number of Injections	Number of Patients
1	52
2	35
3	8
4	3
5	2
	100

The average amount of serum given at each injection was 120 c.c.

Table II shows that over half the cases treated required only one dose of serum, and that over three-quarters required only two doses or less, which would seem to indicate that the 120 c.c. dosage was sufficient. It should be remembered that 120 c.c. represents only 100 c.c. of serum and that the remainder is salt solution in which the 0.30 per cent. trikresol is made up.

Of this group 76 had a white blood count either normal or below. The lowest was between 2500 and 3000. This was without regard to the time in the disease when first seen.

A group of 13 women advanced at least five months in pregnancy is also included. Of this number 3 died, or 23 per cent. Reports from clinicians who have dealt with large groups of pregnant cases show considerably higher percentages. For example, Woolston and Conley[2] had 52 deaths out of 101 pregnant cases, or a mortality of 51.4 per cent. And Harris[3] reported a mortality of 54 per cent. in a group of 678 pregnant women. It would appear, therefore, that even in pregnancy cases the serum helped to lower the mortality.

The total number of deaths out of 100 cases reaches a maxim of 16, or 16 per cent., which is four times that obtained in the Naval Hospital group. But a mere statement of mortality conveys an impression just as erroneous as if one gives statistics on diphtheria antitoxin when used on the third or fourth day of the disease, or on the use of anti-pneumococcus serum Type I in late or moribund cases. In other words, although the use of the serum has frequently seemed to do wonders, yet those accustomed to serum therapy recognize the importance of early administration, and know only too well that certain processes reach a stage irreversible by any procedure, or treatment. In order, therefore, to gain a correct conception of the mortality in this group, it is necessary to give a summary of the type of cases which died. Hence the following table.

Table III.—Summary of Fatal Cases.

Case Number	Age	Condition when Serum was First Given	Day of Pneu.	Time of Death after First Treatment
11	23	Moribund	6	4 hours.
25	27	Severely sick	7	2 wks. 200 c.c. pus removed from pericardium. Died 14 hours later
31	45	Moribund	6	6 hours
38	32	Cyanotic	7	14 hours
46	30	Pregnant, moribund	5	2 hours
50	50	(Poor condition, weighed about 280 pounds)	3	Normal in 18 hrs., remained so for 3 days, sat up suddenly, dropped back dead. Card. failure
55	28	Moribund	8	2 hours
56	30	Moribund	5	5 hours
58	30	Pregnant, cyanotic, irrational	4	3 dys. Ran normal temp. all 3 days, but grew constantly worse
60	45	Moribund	7	30 minutes
64	60	Cyanotic, irrational	6	18 hours
76	33	Pregnant, cyanotic	4	Temp. normal in 12 hrs. but grew rapidly worse
78	30	Severely ill	2	28 hrs. Given 3 doses of serum with no effect
87	28	Moribund	5-6	12-16 hours
89	27	Cyanotic, moribund	5	18 hours
93	28	Moribund.	5-6	12 hours

It is evident from the above that the condition of certain patients did not warrant the use of serum, except as a last resort and then chiefly as a consolation to the rest of the family. For example, cases 11, 31 38, 46, 55, 56, 60, 64, 76, 87, 93, where the first administration of serum was on the fourth day of the pneumonic involvement, or later, or where the patient was practically moribund, as indicated by the fact that death occurred in such a short time after the first visit, a time varying from ½ hour to 35 hours. Case 25 died of hemolytic streptococcus empyema of the pericardium, two weeks after the first administration of serum. Furthermore, case 50 had a normal temperature, pulse, and respiration for 3 days after the first dose of serum, then in an effort to sit up, dropped back onto the bed dead. She was a woman weighing 280 pounds, and in all probability died of acute dilation of the heart.

Therefore, by excluding the cases where the serum was given too late in the disease, and also those who died of complications other than pneumonia, there remain only 3·deaths, or a minimum mortality of 3 per cent. In all probability a just estimate of the efficacy of the serum lies between 3 and 16 per cent.

I now wish to review briefly the work of other observers along the same general line. This includes the use of whole blood, and plasma, as well as just serum separated from the clot. Ross and Hund[4] at Mare Island, California, treated 28 cases by transfusion and ran a control group of 21 similar cases untreated by this method. In the untreated group the mortality was 42.8 per cent., whereas the treated group showed only 21.4 per cent.

Brown and Sweet[5] treated 2 cases of marked broncho-pneumonia by transfusion with excellent results.

MacLachlan and Fetter[6] have reported 54 cases treated by use of citrated blood from convalescent cases. Of this group 34 recovered and 20 died, a mortality of 27 per cent. They suggest the exclusion of 7 cases moribund at the time of first treatment. This would leave 13 deaths, or a mortality of 24 per cent.

The criticism I wish to make in regard to this work is that patients received the blood of only one convalescent at each dose, and since I have shown that about 15 per cent. of such convalescent sera are inactive, there is a fair chance that a number of the treated cases were given blood of no potency. Furthermore, MacLachlan and Fetter used a dosage of only 100 c.c. of whole citrated blood, which would mean about 60 c.c. of serum, a dosage entirely too small, especially in severe cases. Moreover, I have found in the cases at the Naval Hospital as well as in the severer cases in private practice, that better results are obtained by giving at least 2 doses within a 24-hour period. For example, in one desperately severe case with a bad mitral disease, I gave 750 c.c. of serum in five doses, within 48 hours, with a favorable result.

In addition, this method necessitates careful blood grouping, hence a delay in administration and difficulty in pooling blood from four or five cases. Fortunately, when the work at Chelsea was started we had from thirty to forty donors so that, even when we did not use pooled serum, we readily found plenty of donors whose serum had demonstrated potency. Hence practically none of the earlier cases went without receiving an effective serum within 24 hours of the first injection when that proved worthless.

This brings me to the consideration of the work done by Hartman and O'Malley[7] at the U. S. Naval Hospital, Washington, D. C. As soon as our work at Chelsea came to the attention of Admiral Stitt, he wired for all details of technic. These were furnished by me through my commanding officer. Then the work with plasma from convalescent patients was instituted. The choice of plasma was due chiefly to the fact that Dr. Hartman had devised a simple method for transfusion, which was easily adaptable to the preparation of citrated plasma. These observers pooled the plasma, therefore their work is more comparable to that done at Chelsea, than that in which whole blood from single donors was used. Hartman and O'Malley report 111 untreated cases, with 28 deaths, or a mortality of 25.2 per cent., whereas a group of 46 cases, treated with the pooled plasma, showed only 3 deaths, or a mortality of 6.5 per cent. They further report that treatment in all 3 fatal cases was begun late. Their conclusions are: that the toxemia of influenza seems to be neutralized by the plasma of convalescent patients, that a large percentage of this plasma is active, but that most satisfactory results are obtained by pooling.

This brings me to the use of unpooled serum. Kahn[8] reports that only clinically grave cases with toxemia, extreme dyspnea and cyanosis, and extensive lung involvement were chosen, both for serum treatment, and for control. In all, 25 cases received serum; 12 died, giving a mortality of 48 per cent. The control group of 18 similar cases showed 12 deaths, or a mortality of 66.6 per cent.

It is evident from this work that the serum was given the most severe kind of test, yet the difference in percentage of mortality between the treated and untreated cases suggests something more than a mere coincidence. Kahn concludes that from the relative percentage of mortality in the two series, as well as from the surprising beneficial effects of the serum in individual cases, that he believes the serum from convalescent influenza-broncho-pneumonia patients deserves further trial in the treatment of this disease. He does not state whether he used pooled serum. If he did not, the criticism I made concerning the use of serum or blood from single donors holds.

Bass and Ervin[9] at the U. S. Marine Barracks, Paris Island, N. C., selected 55 of the most severely ill patients in their wards. They treated 7 with whole citrated blood and the remaining with unpooled serum. Five out of the 7 receiving the whole blood, and 13 out of the remaining 48 receiving unpooled serum, died; a case mortality of 27 per cent. These writers agree with us that serum from patients without lung involvement is of little value; that donors vary widely in the potency of their sera. They also agree with us in the infrequency of chills, after the use of serum, for only 5 are reported out of the group treated. They conclude that in spite of the high mortality rate, they are satisfied beyond a shadow of a doubt that the use of serum from convalescent influenza-pneumonia patients is of marked value in the treatment of influenza-pneumonia. They emphasize the importance of early diagnosis and treatment.

Finally, I come to the work of Gould[10] at the U. S. Naval Hospital, New York. Gould reports 320 untreated cases of this type of pneumonia, with a death rate of 26.16 per cent., whereas 30 cases treated with unpooled serum showed 2 deaths, or a mortality of 6.6 per cent. I do not mean to infer that this contrast should be accepted as it stands, for Dr. Gould told me that the untreated cases occurred chiefly at the beginning of the epidemic, whereas the cases treated with serum came later. However, I believe it is fair to say that the difference in mortality between the two groups is too great to be accounted for by this time element, especially when I know that many of the treated cases had extensive lung involvement and were decidedly toxic.

Conclusions. After the treatment of over 250 cases of influenza-pneumonia by the use of pooled serum from convalescent patients, there remains no doubt in my mind that when a proper diagnosis is made, and the treatment is correctly carried out, both in hospital and private practice, the course of the disease is decidedly shortened, the death rate is at least cut in two, in cases chosen for their severity, and reduced about three-fourths in any large series in hospital practice where the cases are seen early. These conclusions are substantiated by the reports of at least 12 unprejudiced observers.

REFERENCES.

[1] McGuire, L. W., and Redden, W. R.: Treatment of Influenzal Pneumonia by Use of Convalescent Human Serum. Jour. A. M. A., Vol. lxxii, March 8, 1919, p. 709.

[2] Woolston, W. J., and Conley, D. O.: Epidemic Pneumonia (Spanish Influenza) in Pregnancy. Jour. A. M. A., Vol. lxxi, Dec. 7, 1918, p. 1898.

[3] Harris, John W.: Influenza Occurring in Pregnant Women. Jour. A. M. A., Vol. lxxii, April 5, 1919, p. 978.

[4] Ross, C. W., and Hund, Ervin J.: Influenzal Pneumonia. Jour. A. M. A., Vol. lxxii, March 1, 1919, p. 640.

[5] Brown, W. L., and Sweet, B. L.: Treatment of Influenzal Pneumonia by Citrated Transfusion. Jour. A. M. A., Vol. lxxi, Nov. 9, 1918, p. 1602.

[6] MacLachlan, W. W. G., and Fetter, W. J.: Citrated Blood in Treatment of Pneumonia following Influenza. Jour. A. M. A., Vol. lxxi, Dec. 21, 1918, p. 2053.

[7] O'Malley, J. J., and Hartman, F. W.: Treatment of Influenzal Pneumonia with Plasma of Convalescent Patients. Jour. A. M. A., Vol. lxxii, Jan. 4, 1919, p. 34.

[8] Kahn, Morris H.: Serum Treatment of Post-influenzal Bronchopneumonia. Jour. A. M. A., Vol. lxxii, Jan. 11, 1919, p. 102.

[9] Bass, J. A., and Ervin, C. E.: Use of Serum in the Treatment of Influenza-Pneumonia. Naval Medical Bulletin No. 71. Division of Sanitation, April 5, 1919.

[10] Gould, E. W.: Treatment of Influenza Pneumonia by Use of Convalescent Serum. New York Med. Jour., April 19, 1919, p. 666.

DISCUSSION.

DR. FREDERICK T. LORD, Boston:—I have been much interested in Dr. Redden's work. The necessity confronts us of trying to form a judgment whether the method is of value or not. Unfortunately, I do not believe that the question as to its value can at the present time be answered. There are, however, certain considerations which have a bearing on this matter.

There is little to guide us from analogy with other diseases. Ordinary lobar pneumonia is the nearest analogy we have and it may be said that ordinary lobar pneumonia has nothing to do with the kind of pneumonia under discussion. Experimental studies in animals indicate that protective substances are usually but not constantly present in the blood of patients recovering from the disease. Their inconstancy and presence in positive cases only in small amounts do not suggest that a similar method of treatment applied to ordinary lobar pneumonia would be of much assistance.

In attempting to judge the merits of such a method of treatment it is easy to be misled without a control group of cases. The varying mortality from influenza pneumonia without the serum treatment, in this neighborhood, illustrates how cautious we should be. For example, data obtained from Major Paul G. Woolley, Camp Devens, indicate that during the period from October 2nd to October 29th, there were 231 cases of pneumonia at Camp Devens and that of this number 127 (54.9%) died. Of 2,817 cases at Camp Devens from September 4th to October 29th, 787 (27.9%) died. Comparison of Dr. Redden's series with such a group as this would suggest curative value in the serum. But returns from certain other sources indicate that during the epidemic period the mortality from broncho-pneumonia in non-serum treated groups of cases was low. Thus figures obtained from Dr. Marshall H. Bailey of Cambridge in a small number of cases among the Students' Army Training Corps at Harvard show that of 46 cases with the physical signs of broncho-pneumonia and about 15 more with questionable broncho-pneumonia, there were only five deaths, a mortality of 8.1%. No reliable statistics are available for the civilian community; but reports from certain individual physicians practicing in this neighborhood suggest that the mortality from broncho-pneumonia may be even lower than this. Thus one physician reports only one death from broncho-pneumonia and that in a patient with mitral stenosis, among about 25 cases. Another had no deaths in about 15 cases. A third had only one death, and that in a pregnant woman, in about ten cases, and a fourth no deaths in eleven cases. In this civilian group of about 61 cases only two died, a mortality of 3.2%.

We have had too small a group of serum-treated cases at the Massachusetts General Hospital to draw any definite conclusion. We treated 23 cases with the convalescent serum and lost six out of this group. At the same time we had 25 controls and of these we lost only three. There may have been extenuating circumstances among the treated cases, but that is what we have to show and I think that only mortality counts.

DR. EDWIN A. LOCKE, Boston: I have been extremely interested in this work which Dr. Redden and Dr. Maguire have been doing with convalescent serum in cases of influenza with pneumonia, and in private cases have been much impressed with the apparent excellent results of its use. In a small series of fifteen private cases treated during the past fall and winter my experience seemed so favorable that I felt there could be no question of the value of this method of treatment in influenza pneumonia. I must confess also to the same feeling which Dr. Lord has expressed, namely, that if I had the disease I should wish the serum administered. It is difficult, however, to explain the apparent good results on scientific grounds, and personal impressions are not sufficient to prove its value.

Early in February a special service for influenza cases was established at the Boston City Hospital and thus afforded an unusual opportunity to test the effects of the serum from convalescent cases on a series of patients suffering from pneumonia with influenza. In order to make the test as accurate as possible for each case given this treatment we used a simultaneous control. In other words, in every instance we selected two comparable cases so far as age, duration, type of disease, etc., was concerned, administering serum to one and not the other. Dr. Redden's method of preparation and administration of the serum was followed exactly. Blood was taken only from those convalescing from a severe and typical attack of influenza pneumonia and only pooled serum was employed. Although the clinic was a large one the patients were seldom admitted previous to the fourth or fifth day of their pneumonia and in consequence it was possible to select but a relatively small series of cases in sufficiently early stages of the disease to be considered favorable for treatment. In all, 22 cases have beentreated and controlled by a similar number of untreated cases.

Our results have been entirely negative. In each group there were ten deaths, or a mortality of approximately forty-five per cent. Apart from these figures we have seen no results in individual cases which were in any way convincing. A careful study of the charts of these cases and their controls fails to show any advantage whatsoever in favor of the treated cases. No unfavorable symptoms have ever appeared following the injection of the serum, and so far as we are able to judge, the procedure is entirely free from danger of any sort.

It is unfortunate that the group of cases studied is such a small one, but even so small a number as twenty-two, with controls, is of more value in testing the merits of this method of treatment than many hundreds of cases without controls. It would seem inevitable also that were the use of the serum of as much importance as Dr. Redden's figures indicate, that even in so small a series, favorable results would have been very evident.

In conclusion, I do not feel justified from so limited an experience in condemning the treatment with convalescent serum as without merit. I can only say that we have thus ~~far been~~ unable to demonstrate any.

Dr. William R. Redden, Boston: Of course, I do not know much about Dr. Lord's cases. I know about my own cases. The fact remains that I have treated 250 cases with serum. It does not seem that the lowered mortality was simply accidental, or due merely to a difference in the period of the epidemic.

When you go into a room and find a pregnant woman toxic and ready to slip out, and give that woman serum, and twelve hours later find her convalescent, you cannot help thinking that something more than luck attended the treatment. You feel sure that mere mortality statistics do not tell the whole story.

Now one physician stated that mortality statistics were the only things which impressed him. But to my mind, unless one analyzes the time element they are no good. For any group of cases, both treated and untreated, which came late in the disease, would show about equal mortality. The work of Amos and Chesney on poliomyelitis serum has been discredited chiefly because others attempted to treat only late cases. It so happened that Amos and Chesney built their hospital, got their serum early in the treatment, and gave their serum intraspinally and intravenously, and they kept everlastingly at the work. It was the enthusiasm of these two men, as well as the results they obtained, which inspired me to undertake this work while I was at the Rockefeller Institute.

Furthermore, the treatment of pneumonia by Type 1 serum has fallen into disrepute in this state because it has been carried out improperly. In other words, the State Board will not give out Type 1 serum simply because individuals will not make a proper diagnosis. I have reported 490 cases that have been treated by ten physicians. In no case has there been any doubt about the good reaction of the serum. I have no intention of criticising either of the speakers, but I still think that my position of having treated 250 cases is different from that of the individual who has treated only 30, whether they are controlled or uncontrolled. The controlled cases on the outside have been favorable for those who used serum.

I am not here to make claims, but when one feels that results have been obtained, one rather adheres to the one method which has done some good. I am willing to stand by the judgment of those who have used the treatment.

Both speakers admit that they would have serum treatment if they were so unfortunate as to come down with the disease.

THE SURGICAL TREATMENT OF ACUTE EMPYEMA FOLLOWING INFLUENZA.

By Wyman Whittemore, M.D., F.A.C.S., Boston.

Because the acute empyemas following influenza of which I shall speak today are all my own cases, I shall feel at liberty to discuss them and criticize the way in which they were handled quite freely (and it may be that we shall draw some helpful conclusions from the results).

In a series of 39 cases, 33 at the Massachusetts General Hospital including the private ward and 6 outside, I have operated on and taken care of 38 cases, and if a good deal of emphasis is put on the after care it is because of its very great importance. The one case not operated on is included as this patient got well without operation. This case will be spoken of later.

Of the 38 cases operated on I regret to say that two died. Both of these, I believe, should have lived, and I shall tell you of my mistakes later.

It has been an exceedingly interesting series for many reasons. In the first place they were the sickest large series of empyemas I have ever seen. Many of them had a broncho-pneumonia at the time of operation—and some had a double broncho-pneumonia. In a few cases this persisted for a long time after operation, frequently lasting as long as two or three weeks. Many cases were delirious and a few were unconscious at the time of operation. I saw one young man out of town and sent him to the Massachusetts General Hospital. To this day he does not remember my seeing him at his home or going to the hospital or even being operated on. The physical signs were quite misleading in some cases. Whether one was dealing with a small amount of fluid in the pleural acvity or with a patch of pneumonia was not always clear. Therefore, before operating, aspiration was done when possible. This is an exceedingly necessary step to take. The study of the aspirated fluid is of great importance. It is well to know the organism, the nature of the fluid and the cell count before choosing which operation to do. The patient should be x-rayed when his condition warrants it. The x-ray is not perfection and may make mistakes, but in the great majority of cases what it shows is correct and is of great assistance. For instance, in one case all the physical signs were below the angle of the scapula, but the x-ray showed an encapsulated empyema much higher; and as I believe an encapsulated empyema should be operated on very differently from a general empyema, this gave me my clue not only as to what operation to do, but also as to where to find the pus.

Cultures of the fluid aspirated from 30 of these cases showed the following:

19 Pneumococcus cases.
6 Streptococcus cases.
3 Staphylococcus cases.
1 Streptococcus and Pneumococcus case.
1 No growth.

In a few of the pneumococcus cases that were typed the majority belonged to Group III. The streptococcus cases were not studied as to whether or not they were of the hemolytic group.

When the aspirated fluid shows a cell count of 60% or more polynuclear leucocytes and an organism—I believe in operating. If there are leucocytes and no organism one should not operate. The one case I spoke of as not being operated on, showed many leucocytes but no organism and cleared up without operation. I think this is rather uncommon as usually cases having many leucocytes in the aspirated fluid will, if aspirated again a few days later, show a fluid containing some organism.

I do not want to take up in detail the surgical technique that has been used in this series, but rather to speak in a general way as to what I believe to be the correct method of handling these cases.

I realize that during the last year there have been many cases of empyemas in the army camps and that many surgeons have become much interested in the subject and a great deal has been written. My impression is that in the army they finally concluded that operation should be put off as long as possible and frequent aspirations done first—I believe them to be correct provided one is going to do the old fashioned open drainage operation. I prefer early operation by an air tight closed method. An empyema that is not operated on in the early stages usually develops a definite cavity with a partly collapsed lung, more or less held down by a thickened pleura. If one can operate and drain these cases early enough one rids oneself immediately of this complication. In this case one finds instead a lung partly compressed by fluid, which will immediately expand when the fluid is let out, provided that no air is allowed to enter the pleural cavity. A lung has greater difficulty in expanding against positive pressure without artificial means, in fact, I do not believe that it can. Furthermore, in delayed operation there is more danger of complications—such as pericarditis, pyemia, and septicaemia. Also there is more chance for adhesions to form, resulting in separate pockets of pus.

The air tight closed method—or what I call the catheter suction method—is based on five very important points.

1st. Early operation.

2nd. The necessity for allowing the fluid to escape very slowly. This is important as a large amount of fluid being allowed to escape rapidly from the pleural cavity may throw the patient into great collapse and even sudden death.

3rd. The prevention of pneumo-thorax which would partly collapse the lung.

4th. The sterilization of the pleural cavity with the Dakin's solution.

5th. Suction (to get rid of all the fluid).

The operation is very simple. It can always be done under local anaesthesia. It takes not more than five or six minutes and there is no shock connected with it, and in most cases, no pain. I have done it in individuals ranging in age from one to 60 years.

The success of this method and the early recovery of the patients depends on intelligent individual after care. They should be irrigated with Dakin's solution every two hours when not asleep. Care and intelligence are necessary in doing this. When carefully done there is no discomfort or pain. In private the shortest case I had was 11 days and the longest four weeks. And this means they were entirely healed up and have not recurred. In the general hospital the average length of time was four to five weeks and the longest 10 weeks, this not including two cases that were discharged as having become chronic and were sent home for a while before having some further operation.

The progress of the treatment is determined by bacteriology. After the first week a smear is taken from the pleural cavity and the sinus, and the organisms counted under the high power of the microscope. When there is not more than one organism to three or four fields, the cavity is considered sterile. I, personally, prefer to wait two or three days more, or until there is no organism in either the cavity or the sinus—this being proved by both the cell count and cultures. Then I know that the patient is well and will remain so provided one can keep a sterile dressing over the sinus for three or four days.

It is probably safe in the pneumococcus and staphylococcus cases to consider them well when the count is down to one organism to three or four fields. But in the streptococcus cases this is not so. Every streptococcus must be gotten rid of before closing the sinus, or there will probably be a recurrence.

I do not want to give the impression that this method is a sure cure for all acute empyemas. It is not. Occasionally there is a case in which at the end of four or five weeks we find the count staying up to three, four or five organisms per field. Just why I do not know. Then under gas oxygen a rib has been resected, and a very small cavity has always been found. These cavities have varied from about the size and shape of a hen's egg to that of a lemon, and when packed open with gauze have rapidly healed. It is perfectly safe to use a general anaesthetic at the second operation, as the patient is in good condition and no longer has a septic appearance.

Thirty-four cases in this series were operated on by this closed method. Twenty-eight recovered without further operation. Four needed a secondary operation. One case had a recurrence and one case died. Of the four needing a second operation, three promptly healed up and the fourth—a streptococcus case—left the hospital with a small drainage tube. In this case we were unable to make satisfactory progress as the patient was very difficult to handle and we hoped that by going to the country for a time he might improve more rapidly than was possible in the hospital. The one case that died I believe should not have. At the time of operation he had double broncho-pneumonia and was delirious. Following operation he improved rapidly, his delirium ceased and his pneumonia cleared up. so that at the end of 10 days I thought him well on the road to recovery. Unfortunately the electrical suction apparatus was started on him and by mistake was allowed to run for an hour and a half. At the end of this time he was in a state of near collapse and died in a few hours. I cannot give the explanation of his death. There was no autopsy performed. I suppose there was an obscure pleural reflex that tended to inhibit his heart's action. I feel that it is not safe to allow suction of the pleural cavity to be carried on without some one being present to watch it.

The other operative technique that has been used in this series is the regular Carrel-Dakin one. At the present time I believe in using this only in the small encapsulated empyemas, for the reason that it is not safe to do the closed operation as the cavity may be difficult to find and one must do an open operation in order to be sure of finding it.

There were only four cases operated on in this way. One case did very well and left the hospital cured in three weeks. Two patients required further operation for secondary encapsulated empyemas. These were the only cases of the whole series that had secondary encapsulated empyemas. The remaining case died. This case was—I think—entirely my fault as I picked out the wrong operation. It was a man in the 50s, and I thought he was in better condition than he turned out to be. A rib was resected under gas oxygen. He promptly developed pneumonia on the other side. This rapidly spread and he died in four or five days. In thinking this case over I firmly believe I should have done the simple closed drainage under a local anaesthetic.

COMPLICATIONS.

This series has been remarkably free from complications following operation. And it is well that this was so, as the patients had enough to bear before operation with broncho-pneumonia, which frequently persisted for some time after operation, and all this on top of having influenza.

One case of which I have just spoken developed pneumonia on the other side and died.

One case had a pleural reflex from the suction and died.

One other case had a pleural reflex from the use of Dakin's solution and almost died, but finally recovered.

Two cases, only, developed secondary encapsulated empyemas and these have both done well following the secondary operations. This is quite remarkable to me, as during the last year army camps have reported considerable numbers of secondary encapsulated empyemas. In these reports the diagnosis was based on the x-ray findings and not on operative findings, and I believe the diagnosis open to question. In a series of 100 consecutive acute empyemas these two are the only ones that I have had.

The reflex from the pleura is a very interesting and important question, and one that must be considered in using Dakin's solution, or any other solution for irrigation of the pleural cavity. Every one realizes that the pleura is exceedingly sensitive, and irritating it may set up a dangerous reflex. One occasionally hears of a patient's sudden death from aspiration. In an air tight drainage irrigation must be done with great care. Frequently one sees patients in whom severe coughing is caused by a small amount of Dakin's solution being put into the pleural cavity. But this quickly quiets down. One patient in this series almost died while being irrigated. He had been irrigated for three or four weeks several times each day without any discomfort, and then suddenly—out of a clear sky—collapsed during the irrigation, and this was being done by the same man and in the same way as previously.

Finally, one case had an acute appendix during the convalescence. He was operated on and promptly recovered.

No case developed pericarditis or septicaemia.

During the last two years the surgery of acute empyema has made great advances. And these are due, I believe, first to the closed suction method, and second, to the use of Dakin's solution. Of course we owe the latter to the war, but the closed method we were familiar with and had been using for some time before this country entered the war.

There may be some one here who is skeptical as to the efficacy of this method, and to him I would say that, even if it has not cured every case, yet it has a distinct contribution to make toward ultimate recovery, as it will often tide a patient over his extreme septic condition, and any operation that is needful can be done later.

I am convinced that there should have been no mortality in this series, and I have shown you how one death was due to careless use of the suction apparatus, and how, in the other case, the wrong operation was decided on.

In conclusion I would say once more that I firmly believe in early operation by means of a closed air tight suction technic done under local anaesthesia and followed by the intelligent use of Dakin's solution.

DISCUSSION.

DR. HALSEY BEACH LODER, Boston: I want to call attention to the similar group of cases we have had at the City Hospital. As Dr. Whittemore has set a standard for operation in empyema, it makes us sit up nights and ponder. We ought to take these results to heart.

Dr. Whittemore's results are based on early closed operation and suction apparatus and Dakin's solution. My operation is based on the fact that Dakin's solution and suction are hard to obtain outside of big institutions and my results are based on the fact that an empyema operation must be done in the home rather than in the hospital. His results cannot be obtained in the home. Our attempt to get equally good results without the use of either Dakin's solution or suction has been carried out in this way. The cases have been aspirated as soon as the diagnosis has been made or suspected—that means drawing off as much of the purulent fluid as possible. The fluid was sent to the laboratory and then an intravenous injection of serum was given and the patient's temperature dropped flat; in the course of a few days the fluid reaccumulated in the chest but was sterile and the virulence of the infection was over. The patients were aspirated three or four times in the usual way if there was any sign of reaccumulation of fluid, and 15 ounces of fluid taken away. By the time they had been aspirated three or four times they developed a small localized empyema. Now, when you have that small localized empyema, it is sometimes hard to find it. If the doctor has been doing tapping from the first and knows where his needle will get pus, it is all right. You must either do that or have the help of stereoscopic plates, which will show you localized empyemas touching the chest wall at certain points. When the case has got to that point we resect a rib, and most of the cavities have been packed with gauze, especially the small ones, and drained, and all have healed up within six weeks.

So much for the pneumococcus cases, in which the injection of serum is used and aspiration up to the patient's tolerance until a localized empyema is developed. As to the streptococcus cases, I am rather discouraged. Those cases treated by the old rule of thumb—turn them over to the surgeon and let him operate—are sure to be pushed over into eternity. Aspiration and repeating at 24 hour intervals will tide those cases over. Closed drainage put in will help some of those cases, but I cannot but believe that in streptococcus empyema removal of the fluid is touching but a small part of the patient's infection. The streptococcus is in the chest and in the blood as well as in the lungs, and I think that the treatment is to come from the medical side or from the serological side. So far as the fluid in the chest embarrasses respiration it is a detriment.

Now a word about Dakin's solution: I have reason to believe that it is more than useless, and an element of danger is introduced by using Dakin's solution which is not Dakin's solution. In other words, Dakin's solution must be true Dakin's solution and not a guess at it.

The day has gone by when empyema is treated by rule of thumb, and that rule of thumb is that when pus can be found in the chest the surgeon is to take it out by making a hole. The day of that treatment is over. The mortality is 25% to 35%. The point now is that the empyema is to be treated at the proper time and first treated by the physician and not by the surgeon, and my word to you is to keep away the hand of the surgeon until he has learned his lesson.

◆

PRESIDENT OF THE ROYAL COLLEGE OF PHYSICIANS OF IRELAND.—Dr. James Craig, professor of practice of medicine in Trinity College, Dublin, has been elected president of the Royal College of Physicians of Ireland.

Book Reviews.

Materia Medica. By DR. EDWARD R. SQUIBB.
New York: E. R. Squibb & Sons. 1919.

The 1919 edition of Squibb's *Materia Medica* presents, as have its predecessors, trustworthy information concerning the nature, quality, and uses of medicinal products. It includes an alphabetical list and description of the products manufactured at the Squibb Laboratories, including all the articles of the United States Pharmacopoeia (IXth Revision) and of the National Formulary (IVth, 1916 edition), and also many facts concerning a large number of non-official and newer remedies which are approved by the Council of Pharmacy and Chemistry of the American Medical Association. This book sets forth the origin, Latin and English titles, synonyms, physical, chemical, and pharmaceutical characteristics, and therapeutic uses of these products. The general character and arrangement of the contents of this volume are similar to previous editions, although the names of such products as have become obsolete have been omitted, and a large number of additions have been made. This book is a trustworthy compendium of the approved materia medica of today, and will be found a valuable aid to the physician and the pharmacist.

War Neuroses. By JOHN T. MACCURDY, M.D.
Cambridge: University Press. 1918.

Functional nervous disorders arising in soldiers as an immediate result of conditions of modern warfare present a problem which is being regarded as increasingly important by the medical profession. The author of *War Neuroses,* with a past experience of investigation of the psycho-neurosis of civil life, has observed in British hospitals the special forms of neurosis arising from the unusual strain of the present war. He classifies the conditions of war neurosis into two main groups—anxiety states and conversion hysterias. In the former, various mental factors develop into states of anxiety which are accompanied by symptoms closely allied to anxiety in non-pathological forms. In the conversion hysteria group, there is manifested an alteration or dissociation of consciousness regarding some physical function. Anxiety states develop most frequently among officers, the conversion hysteria among privates and non-commissioned men—a fact which may be explained by differences in education and responsibility. The cases described by the author in this book show that even when concussion or fatigue is the main agent in producing the condition, the mental elements are the determining factors in the development of war neurosis.

Manual of Laboratory Diagnosis. Compiled by Herman John Bollinger, S.B., M.D. Baltimore: Medical Standard Book Company. 1919.

This *Manual of Laboratory Diagnosis* has been compiled from lectures given by Drs. Miller, Batchelor, Evans, Baetjer, and Guthrie, of Johns Hopkins Medical School, and presents in summary form lectures of these instructors during the past year. These notes are somewhat limited and the methods are subject to change with time; yet the essential subject matter covered in the lectures on urine analysis, examination of the gastric contents, sputum, feces, parasitology, and hematology, clearly outlined and illustrated, is of considerable value. Although not an exhaustive treatise of the subjects presented, the convenient outline form in which this book is written makes it an unusually practical and helpful guide for teaching and for comprehensive review.

Studies from the Rockefeller Institute. Volume XXX. New York: The Rockefeller Institute for Medical Research. 1919.

Reports of investigations carried on at The Rockefeller Institute for Medical Research have been collected and published in Volume XXX of *Studies from the Rockefeller Institute.* This work contains reprints of significant studies which have been published previously in various medical journals.

The contributions of greatest interest, perhaps, are the reports of Jacques Loeb in the field of experimental biology. In an article discussing the chemical basis of axial polarity in regeneration, he describes experiments which seem to prove that axial polarity in the regeneration of a stem is due to the fact that the apical bud and apical leaf send out substances toward the base of a stem which inhibit the buds from growing out: he expresses the belief that the reason for the most apical bud coming out first may be due to the fact that it will be the first to be free from these inhibitory substances. A study of the chemical mechanism of regeneration of plants gives evidence that the inhibiting action of the stem upon the short production in the leaf is probably due to the absorption of material from the leaf by the stem. In a third article, Loeb considers the chemical basis of correlation, and cites experiments to illustrate the production of equal masses of shoots by equal masses of sister leaves in Bryophyllum calycinum. In a study of the ionization of proteins and antagonistic salt action, he describes a new method which he has discovered which will allow the study of the effect of neutral salts on gelatin. Loeb has reported, also, his experiments on the sex of parthenogenetic frogs. He succeeded in raising twenty leopard frogs, including both sexes, from unfertilized eggs to the age of from ten to eighteen months, some of them with full normal development.

In addition to these interesting experiments by Loeb, among other articles particularly worthy of attention are the following ones: "Fluid Substitutes for Transfusion after Hemorrhage," by Peyton Rous and George Wilson; "Further Studies on the Properties of Pure Vaccine Virus Cultivated *in Vivo,*" by Hideyo Noguchi; "Methods for Intravenous Injection of Guinea Pigs," by Rous; and "Free Antigen and Antibody Circulating Together in Large Amounts," by Rous and Oswald Robertson.

This volume contains many other important articles, illustrated by tables and plates, in the fields of pathology and bacteriology, physiology and pharmacology, chemistry, experimental biology, and animal pathology, and reports of the work of the Hospital of the Rockefeller Institute.

The Johns Hopkins Hospital Reports. Volume XVIII. Baltimore: The Johns Hopkins Press. 1919.

Among the most interesting papers included in Volume XVIII of the Johns Hopkins Hospital Reports, are a number of contributions by M. C. Winternitz and his collaborators. His experiments, illustrated by charts, on the effect of feeding glands of internal secretion to chicks are of interest in spite of conflicting results. Studies made by Winternitz and H. C. Schmeisser on the relation of fowl typhoid to leukemia of the fowl give evidence of a close relationship between these two conditions. In an article, illustrated by plates, describing "Hyaline Degeneration of the Islands of Langerhans in Pancreatic Diabetes," Winternitz discusses experiments with animals and those dealing with the histopathology of the human pancreas in diabetes mellitus. Of considerable interest is his report on "Generalized Miliary Tuberculosis Resulting from Extension of a Tubercular Pericarditis into the Right Auricle." A paper by T. R. Boggs and Winternitz reports an interesting case of acute hypophysitis, arising by extension from a purulent sphenoidal sinusitis and associated with definite signs of an interference with the function of the gland. "The Rôle of the Autopsy in the Medicine of Today," by Winternitz, presents convincing evidence of the importance of post-mortem examinations. Excellent plates and charts illustrate "Experimental Nephropathy in the Dog," by Winternitz and W. C. Quinby; and the observations of Winternitz and Schmeisser on "Mesarteritis of the Pulmonary Artery" are significant. These contributions, together with others by different investigators, make this volume one of unusual interest.

THE BOSTON
Medical and Surgical Journal
Established in 1812

An independently owned Journal of Medicine and Surgery published weekly under the direction of the Editors and an Advisory Committee, by the Boston Medical and Surgical Journal Society, Inc.

THURSDAY, DECEMBER 11, 1919

EDITORS
Robert M. Green, M.D., *Editor-in-Chief*
George G. Smith, M.D., *Assistant Editor*
Walter L. Burrage, M.D., *For the Massachusetts Medical Society*

COMMITTEE OF CONSULTING EDITORS
Walter B. Cannon, M.D.
Harvey Cushing, M.D.
David L. Edsall, M.D.
Reid Hunt, M.D.
Roger I. Lee, M.D.
Robert B. Osgood, M.D.
Milton J. Rosenau, M.D.
Edward C. Streeter, M.D.

ADVISORY COMMITTEE
Edward C. Streeter, M.D., Boston, *Chairman*
Walter P. Bowers, M.D., Clinton.
Homer Gage, M.D., Worcester
Joel E. Goldthwait, M.D., Boston
Lyman A. Jones, M.D., Swampscott
Robert B. Osgood, M.D., Boston
Hugh Williams, M.D., Boston
Alfred Worcester, M.D., Waltham

Subscription Terms: *$5.00 per year, in advance, postage paid for the United States, $6.56 per year for all foreign countries belonging to the Postal Union.*

An editor will be in the editorial office daily, except Sunday, from twelve to one p.m.

Papers for publication, and all other communications for the Editorial Department, should be addressed to the Editor, 126 Massachusetts Ave., Boston. Notices and other material for the editorial pages must be received not later than noon on the Saturday preceding the date of publicaton. Orders for reprints must be returned in writing to the printer with the galley proof of papers. The Journal will furnish free to the author, upon his written request, one hundred eight-page reprints without covers, or the equivalent in pages in the case of articles of greater length.

The Journal does not hold itself responsible for any opinions or sentiments advanced by any contributor in any article published in its columns.

All letters containing business communications, or referring to the publication, subscription, or advertising department of the Journal, should be addressed to

Ernest Gregory, *Manager*

126 Massachusetts Ave., Corner Boylston St., Boston, Massachusetts.

ORGANIZATION OF THE MEDICAL PROFESSION.

It is probably true that in no state of the Union are the members of the medical profession of a higher type than they are in Massachusetts. In their care of the needy and in their relations to one another, the doctors of this Commonwealth can be relied upon to do what is right. There is lacking, however, so far as the writer is able to judge, a sense of public responsibility. This is no doubt due in part to a dislike of publicity, in part to the fact that the men at the head of the Massachusetts Medical Society have been of so fine a stamp that the members of the Society have been well satisfied to leave such matters in their hands. Nor is there any doubt that the State Committee on Legislation, within whose province most of these questions fall, has fulfilled its duties most faithfully. Would it not be better if their light were not hid quite so completely? Would it not be advantageous to the public and to the medical profession alike if the latter were kept more fully informed in regard to the questions at issue, and were welded into an instrument more adapted to hewing public opinion into the proper shape?

In this connection it is interesting to note the ideas which prevail on the other edge of our country. President H. P. Marshall of the Washington State Medical Association, in his address before the thirtieth annual meeting of that body, emphasizes the necessity of organization in medicine. He points out that at present the officers of the state association change every year, and are therefore unable to formulate and carry out any instructive policies. He suggests the formation of an Organization Committee. This committee should consist of a State Organizer elected every three years by the House of Delegates, and of one man selected from each county by him. "This committee should have full power to work out all medical policies, being governed by the instructions of the House of Delegates. In the absence of a specific instruction on a given question, the committee of organization shall decide it."

Dr. Marshall believes that by the efforts of such a committee vastly more influence could be exerted upon public opinion than is possible without organization. Such a committee would be in fact a publicity committee, which would present to the medical profession the facts upon each important question and would thereby arouse their interest in that question. It is unlikely that this committee would succeed if it simply issued an edict that such a measure was wise or unwise, and must, therefore, be adopted or be killed.

Whether or not one agrees with the details of Dr. Marshall's plan—and there are certain objections to giving to one man a position of so much power—one cannot disagree with his reasons for the necessity of organized effort by the medical profession in behalf of proper legislation and of wise medical policies.

◆

THE UNITED STATES TRAINING CORPS FOR WOMEN.

A training camp for women was established last August at Lake Geneva, Wisconsin. This camp was an outgrowth of the work conducted in Washington during the war by Miss Susanna Cocroft, who instituted courses in physical training for women employed in the government offices. Nearly four thousand women took part in these exercises. As a result the U. S. Training Corps for Women was formed.

At Camp Geneva, 147 women, representing twenty-two states, and ranging from twenty to sixty-five years of age, were enrolled. The training was not for militaristic ends; it was intended simply to improve physical health and vigor. The U. S. Training Corps has four definite ends in view.

1. To build up the health and strength of the women in camp by teaching correct posture, correct breathing habits, correct habits of walking, setting-up exercises and military drill followed by complete relaxation after every exercise period.

2. To train teachers who will go back to their localities and conduct classes in the public parks or other suitable places, or in any of the large industrial organizations. Many of the large industrial institutions in Chicago and throughout the country have already interested themselves in this movement and are making provisions to have this training for their employees next year.

3. Each girl returns to her home to use her influence in having the same sort of training given to the school children in the public schools with fifteen-minute open air exercises each day that the weather will permit.

4. And most important from the standpoint of public health, each woman returns to her community pledged to help the local state, county, and city health organizations.

It is not at all unusual to hear ex-service men say that they never felt so well as when they were in the army. There is no reason why a similar life in camp adapted to women's needs would not yield to them the same satisfaction. Change of environment, new companions and arduous exercise in the open air, cannot fail to be of benefit, especially to those girls whose work keeps them the rest of the year indoors.

A NEW MOVE TO COÖRDINATE HEALTH ACTIVITIES.

A conference to be held in Washington to coördinate the work of the various public health associations of the country has been suggested by Surgeon General Blue of the U. S. Public Health Service in a letter sent to State and City Health Officers, to the head of the American Red Cross, The American Public Health Association, the American Medical Association, the National Tuberculosis Association, the International Health Commission, the National Safety Council, the American Child Hygiene Association and other health agencies. Certain phases of the work, such as those relating to cancer, tuberculosis, and venereal diseases, public health nursing and medical supervision of school children, are of interest to all sections of the country. Other problems are more vital in certain localities. The program will be so arranged as to give due consideration to matters of local interest, as well as to those of wider scope.

To those endeavoring to improve the health of the nation, the record of the years 1900-1917 offers much encouragement. The death rate of typhoid fever fell from 33.8 per 100,000 in 1900 to 13.4 in 1917; that of diphtheria from 35.4 to 16.5. In 1900, 190.5 per 100,000 died of tuberculosis; in 1917, 146.4 died from that cause. So many of the causes of death are preventable that it seems not too sanguine to hope that the next twenty years will witness an equal decline in the number of deaths from communicable disease.

MEDICAL NOTES.

10,245 Nurses in Army Service Overseas.—A final report made by Miss Julia C. Stimson, director of the Army Nursing Service abroad, shows that between May 2, 1917, and May 31, 1919, 10,245 nurses out of a total of 21,480 enlisted for war service served overseas. Of this number, three were wounded in action and 266 died while on duty. The first six detachments of nurses sent to France replaced nurses in British hospitals. The work of the American women became very heavy in July, 1918, with their own army. Between July 13 and November 11, it was not at all uncommon for nurses to work fourteen and eighteen hours a day for weeks at a time, and some hospitals with only seventy or eighty nurses cared for patients to the number of 2100. On the day of the signing of the armistice 184,421 American soldiers, sick and wounded, were in hospitals, and there was a shortage of 6,925 nurses, reported to be due to the fact that it had not been possible to secure adequate transportation of the nurses.

Tar as the Cause of Industrial Disease.—Attention has been called recently to the fact that tar is capable of producing a skin disease which properly should be classed among the avoidable industrial diseases. It appears to have been recognized in England, Germany, and France. The disease manifests itself in the obliteration of the glandular orifices of the skin and in succeeding lesions, but yields readily to treatment.

Antirabic Institute of Cairo.—The Antirabic Institute of Cairo was founded as a private association in 1899, and was supported by the Italian Benevolent Society until 1906, when it was taken over as one of the divisions of the Egyptian Health Department. It consists of a building containing eight service rooms on the entrance floor and the director's residence above. It is equipped with a thermostat designed especially for tropical climates, two hot-air sterilizers, one steam sterilizer, an autoclave, a good microscope, and instruments for dissection and inoculation. During the first eight years, the Institute treated 2221 persons who had been bitten by canines, equines, felines, and human beings. Fifty-five persons died.

After 1906, the Institute continued its former work, with additional equipment and some special technique. During the last eleven years, 7382 persons have been treated by the Cairo Antirabic Institute, with a crude mortality of 2.37 per cent. and a corrected figure of 0.78. In both periods, dogs were responsible for between eighty and ninety per cent. of the bites.

Tuberculosis in Germany.—In a recent issue of *The Medical Press*, there have been published extracts from a report of two Americans, Miss Jane Addams and Dr. Hamilton, who have described conditions as they saw them in Germany a week after the signing of peace. The terrible results of the prolonged food blockade on the German people are particularly shown by the increase in tuberculosis in German cities. Germany has lost the progress of years in the control of this disease, and now is in a condition no better than in the eighties, before the discovery of the tubercle bacillus by Koch. The rate increased slightly before the tightening of the blockade and rapidly after it, indicating that the increase in this disease was due to lack of food and not to other incidents. A comparison of figures before and after the war is significant: in 1914, deaths from tuberculosis in German cities of over 15,000 inhabitants was 40.374; by 1916 it had risen only to 48.779, but by 1917 it was 67.800. It is probable that the rate for 1918 and 1919 will prove to be still higher. The effects of lack of food on tuberculosis have been so great that German physicians are beginning to regard tuberculosis not as an infectious disease, but as a disease of nutrition.

A visit to the hospital of the Charité connected with the University revealed the fact that fully half of the children were tuberculous, due both to increased infection from overworked and underfed mothers and from fathers who have returned from the front with tuberculosis, and to the loss of resistance among the children themselves because of partial starvation. The far-reaching effects of these conditions cannot be estimated at present, for it is likely that each year for the next twenty years will show a higher sickness rate from tuberculosis in Germany than that country has known for decades. Although many cases will not develop until later in the lives of these children, there are already many examples of the most terrible forms of the disease. Not only in the Charité, but also in the hospitals of Halle, Leipsiz, and Frankfurt may be found children with pronounced tuberculosis of the glands, with tuberculosis of several bones at once, and cavity formations, which ordinarily occur only among older people. To add to the tragedy of the situation, physicians could only recognize their own impotence, fighting a fight which they could not hope to win without being able to provide nourishing food to their patients.

Among the adult population there have developed a considerable number of cases of the so-called galloping consumption, which was of rare occurrence in Germany before the war. This is not confined to hospital patients, for one physician stated that at one time he had thirty cases in his own private practice among the well-to-do.

The City Orphanage in Berlin, although ordinarily it has taken under its charge only healthy children, is forced now to accept the tuberculous and rachitic. Before the war, the Pirquet skin test was positive in ten per cent of the children; now it is positive for thirty per cent., and actual illness has increased five-fold. In Halle there is ten times as much skin tuberculosis as before the war. In Frankfurt there are cases of pulmonary tuberculosis even among babies. The only way of checking this alarming increase in tuberculosis is by ensuring the sufferers a sufficient amount of nourishing food. One of the agencies which is helping in this relief work is the Save the Children Fund (326, High Horborn, W.C.1).

The Welsh National Medical School.—It has been announced in *The British Medical Journal* that the proposal of the Royal Commission,—that the Welsh National Medical School be made a separate constituent college of the University of Wales,—has not met with the approval of the University, for the reason that it is deemed undesirable from an educational point of view to separate the medical students from the general body of students and to discourage intercourse between the professors in the medical and other faculties. It is realized, however, that it is of great importance to organize the medical school on a national rather than on a local basis; in order to accomplish this, it has been proposed that the college council shall be the chief governing body of the school of medicine, but that wide administrative and executive functions and powers shall be delegated to the board of medicine. It has been suggested that the "unit" system be adopted with regard to the chairs and lectureships in the faculty of medicine: the medical unit to consist of two full-time teachers, one professor, one assistant professor, and part-time lecturers on toxicology, forensic medicine, and dermatology; the surgical unit to include three full-time teachers, one professor, two assistant professors, and part-time lecturers on orthopedics, genitourinary surgery; ophthalmology, and diseases of the ear, nose, and throat; the unit of gynecology and obstetrics to have one full-time professor and one full-time assistant professor. It has been proposed that there be also an electrical department with a medical superintendent, and clinics for psychiatry and neurology, pediatrics, dermatology, and dentistry.

Bubonic Plague in New Orleans.—Four cases of bubonic plague, two of which resulted in death, have been reported recently from New Orleans.

Miscellany.

THE EPIDEMIOLOGY OF PLAGUE.

From an issue of the *Lancet* comes the following statement concerning plague:

"Bubonic plague is endemic in the British Empire and its presence in normal times is a constant menace to the public health of the community. Under war conditions, which necessarily entail increased movement of population with less efficient means of control, naturally the risk is increased." Dr. John Brownlee's contribution on Feb. 8th at the Royal Society of Medicine to the theory of plague epidemiology is therefore specially welcome. As statistician to the Medical Research Committee he dealt with the broad aspect of the whole subject, showing in the first instance that the great bulk of plague epidemics in such large towns as London, Bombay, Calcutta, and Sydney during the last three centuries have had certain common features. He continued:

"These epidemics have been symmetrical in shape and their form essentially constant during the whole period. The same form of epidemic has occurred among rats. Two different theories may be entertained. Assuming infection to be proportional to the number of acute cases at any moment, the epidemic ends, on the first hypothesis, from lack of susceptible persons and, on the second, from loss of infecting power on the part of the organism. In Bombay the first hypothesis is numerically consistent with the data for brown rats, but not in the case of the black variety. In man the form of the epidemic shows points of difference demanding some secondary hypothesis, *e.g.*, that disease foci when present in large numbers are more effective in spreading the disease than sparse ones; following the law which connects density of population and death-rate. In the United Provinces of India, where marked variations in weather occur from year to year, the November humidity is closely associated with the humidity of succeeding months and with the number of plague cases in the epidemic, the exact relationship being that the logarithm of the number of cases is proportional to the humidity. Periodicities independent of the solar year probably exist in Poona, Cawnpore, and other towns. Weather conditions varying from month to month do no more than modify the form of the natural epidemic.

"The broad epidemiological aspect would also be of great interest in regard to the outbreak of pneumonic plague reported from China.

"Early in January it was officially announced from Peking that pneumonic plague had broken out on the borders of Mongolia, and that the infection had spread into Shansi, one of the four northern provinces of China. The disease was then threatening to extend southwards and eastwards into the populous province of Chih-li, in which is situated Peking, the capital of the Chinese republic. The present outbreak resembles closely that which, early in 1911, swept over the Mongolian border into Manchuria, and in little more than three months carried off between 50,000 and 60,000 victims. That epidemic, like the present one, began in the cold season, and both appear to have been aided in their development by the exceptional severity of the winter. Both outbreaks had their origin on the Mongolian border, which is a recognized endemic area of plague, and the endemicity is said to be associated with the presence of the disease in a species of marmot, called the tarbagan, found there in large numbers and hunted in the autumn months for the sake of its fur, now in great demand. In both outbreaks the infection spread rapidly along the lines of railway communication, and in neither of them was the diffusion assisted by the agency of rats or fleas, the disease spreading alone by personal contact—that is, by the inhalation of the droplets containing plague bacilli coughed up by those suffering from the malady. Owing to the extreme cold, overheating and overcrowding of houses are promoted, doors and windows are kept closely shut, chinks and crevices are stopped up to exclude the outer air. A case of pneumonic plague, shut up with a crowd in such circumstances of overheating, lack of ventilation, and insanitation, would infect all exposed. In the Manchurian epidemic every person attacked by the disease succumbed, there being no instance of recovery on record. Should pneumonic plague become epidemic, as seems probable, in the populous province of Chih-li, the consequences are likely to be serious, for countless numbers of the inhabitants are suffering from severe privations, the result of recent floods, and cannot be in a condition to offer much resistance to the onset of a grave infection. At the beginning of the outbreak the Chinese Government was strongly urged to take immediate measures for stopping the spread of the disease, and accordingly a medical commission, with Dr. Wu-Lien-Teh, Director of the North Manchurian Anti-Plague Service as leader, was dispatched to the Shansi-Mongolian border. On arrival they were, unfortunately, met with the undisguised hostility of the people, whose unreasonable attitude was largely supported by the local Government officials and by the military. It is to be hoped that the Chinese Government will support the recommendations of the Medical Commission, led by Dr. Wu, and that steps will at once be taken to bring to book the Shansi officials, and other parties concerned, who permitted the ill-treatment of the medical commissioners sent to assist the inhabitants of the province in averting an epidemic which is fraught with such wide-reaching consequences."

SOCIETY NOTICES.

Suffolk District Medical Society.—A meeting of the Medical Section of the Suffolk District Medical Society will be held at the Boston Medical Library, No. 8 The Fenway, at 8.15 P.M., on Wednesday, Dec. 17. Papers: The Relative Value of Some Modern Methods of Diagnosis and Treatment of Chronic Peptic Ulcer, by Dr. Franklin W. White; The Diagnosis and Treatment of Diseases of the Colon, by Dr. Henry F. Hewes; Discussion will be opened by Dr. George W. Holmes and Dr. Daniel F. Jones.

Edwin A. Locke, M.D., *Chairman*,
George R. Minot, M.D., *Secretary*.

Springfield Academy of Medicine.—The December meeting of the Academy will be held on Tuesday evening, December 9, 1919, at 8.30 o'clock.

Report of a case of leprosy by Dr. S. J. Paul of Springfield.

Address, "Lung Surgery," by Dr. Carl Eggers of New York, recently returned from Government service.

L. D. Chapin, M.D., *Secretary*.

Worcester District Medical Society.—The next regular meeting of the Society will be held on Wednesday, December 10, at 4.15 P.M., in Grand Army Hall, 55 Pearl Street, Worcester.

Communications:

"Gas Bacillus Infection in Civil Life," Dr. Ernest L. Hunt.

"The Standardization of Clinical Thermometers, with demonstration," Thure Hanson.

Dr. William J. Delahanty, *President*,
George A. Dix, *Secretary*.

RECENT DEATHS.

Dr. Charles Fremont Taylor died recently at his home in Philadelphia. Dr. Taylor was born in Attica, Indiana, in 1856, and was graduated from the Central College for Physicians and Surgeons, in Indianapolis, in 1880. He practiced in Indiana for a few years, and later became editor of *The Medical World* and *Equity*.